

University of Wisconsin-Stout
JOURNAL OF STUDENT
RESEARCH

Volume IV, 2005

learning. experience. opportunity.



University of Wisconsin-Stout
Journal of Student
Research

Volume IV, 2005



Copyright © 2005

University of Wisconsin System Board of Regents doing business as
University of Wisconsin-Stout

All rights reserved. No part of this book may be reproduced in any form
without the permission of the University of Wisconsin-Stout

University of Wisconsin-Stout Journal of Student Research, Volume IV, May
2005.

Amy D. Barr
Editor-In-Chief

Alyssa A. Nelson
Senior Editor

Jennifer J. Guggenheimer
Assistant Editor

Susan Foxwell
Research Administrator

John Thompson
Research Coordinator

Stout-Solutions-Research Services
University of Wisconsin-Stout
152 Vocational Rehabilitation Building
Menomonie, WI 54751
(715) 232- 1126
<http://www.uwstout.edu/rps/uwsjsr>

Forward

We would like to introduce the 4th Edition of the Journal of Student Research. The University of Wisconsin-Stout promotes and recognizes undergraduate and graduate research.

One of the major goals for the 4th edition of the Journal was to increase the variety of articles to represent the different programs at the University of Wisconsin-Stout. The Journal features articles from such programs as Art and Design, Training and Development, Packaging, Psychology, Food and Technology, and Human Development and Family Studies.

The Journal provides a competitive edge for students in many ways. The Journal allows students to have their work published in print and through an electronic version providing recognition from businesses, organizations, and other interested parties throughout the World.

The production of the Journal demonstrates a collaborative effort between students and faculty at UW-Stout. Students are involved in the cover design, editing, and printing and layout for the Journal, and faculty review articles through a blind review process. We would like to thank everyone involved in the collaborative effort for the production of the 4th Edition of the Journal of Student Research.

Amy D. Barr
Editor-In-Chief

Executive Editorial Board

Editor-In-Chief

Amy D. Barr

Senior Editor

Alyssa A. Nelson

Assistant Editor

Jennifer J. Guggenheimer

Research Administrator

Susan Foxwell

Research Coordinator

John Thompson

Faculty Reviewers

Dr. Abel O. Adekola

Professor

Business

Dr. Nancy A. Schofield

Associate Professor

Technology

Dr. Joseph A. Benkowski

Professor

Communication, Education, & Training

Dr. Charles Bomar

Professor

Biology

Robert Heuermann

Assistant Chancellor

John W. Lui

Director

Vocational Rehabilitation Institute

Executive Editorial Board

Charles M. Lume
Assistant Professor
Art & Design

Denise A. Madland
Senior Academic Librarian

Dr. R. Kirk Mauldin
Assistant Professor
Social Science

Dr. Laura E. McCullough
Associate Professor
Physics

Dr. Dennis J. Mikkelsen
Professor
Math, Statistics, & Computer Science

Dr. Ruth L. Mikkelsen
Professor
Math, Statistics, & Computer Science

Dr. Stephen C. Nold
Associate Professor
Biology

Colleen L. Rogers
Business Manager
CTEM

Ronald H. Verdon
Professor
Art & Design

Dr. Robert Berkemer
Professor
Technology

Dr. Scott D. Zimmerman
Associate Professor
Biology

Cover Design

Eliza M. Swanson
Graphic Design Student

Layout and Printing

Students in Graphic Communications Integrated Manufacturing Practicum Class (GCM-443): Davi Xiong, Kimberly Smith, Rebecca Hartung, and Dr. James Tenorio, Instructor

Special Thanks

Dr. Robert Sedlak
University of Wisconsin-Stout, Provost

Dr. Bruce Maylath
Practicum Supervisor
Department of English and Philosophy

Dr. Daniel G. Riordan
Practicum Supervisor
Department of English and Philosophy

Sally A. Krier
IS Resources Support Tech-Senior
Continuing Education

Staff in University Relations

Table of Contents

Nanocomposites

Sheri Hildebrandt

Advised by Dr. Claire K. Sand p. 9

Work Team Conflict Resolution

Randy Kerr

Advised by Dr. Katherine M. Lui p. 19

Packaging Redefines Fresh Breath

Laura Lee Lentner

Advised by Dr. Claire K. Sand p. 25

The Effects of Simultaneous Pairing

Jonathon Wood and Emmalee Ericksen

Advised by Dr. James Byrd. p. 33

Transition from Home to College

Jennifer Johnson and Jamie Lutz

Advised by Robin Muza p. 41

Male Odalisque

Roland Krager

Advised by Charles Lume p. 49

Ominous, Atmosphere, and Wheaton, MN

Ben Bauer

Advised by Charles Lume p. 53

Aluminum Bottles are a Success

Nathan Goltz

Advised by Dr. Claire K. Sand p. 57

Packaging Defines the OTC

Luke Green

Advised by Dr. Claire K. Sand p. 65

Schools Linked to Obesity: Issues, Concerns and Reforms

Andrea Kolbeck

Advised by Dr. Carol Seaborn p. 75

Adapt to China’s Shipping Environment

Justin Nunez

Advised by Dr. Claire K. Sand p. 83

Taking the Load off a Learner’s Mind

Timothy Barker

Advised by Dr. Katherine M. Lui p. 91

Recycling Improves USA

Luke Monroe

Advised by Dr. Claire K. Sand p. 103

Nanocomposites Improve Package Properties

Sherry Hildebrandt

Undergraduate Student, Packaging Engineering

Key Words: nanocomposites, nanotube, PET

Abstract: *Nanocomposite technology has been described by some as the next great frontier of material science in packaging. This technology was developed to improve barrier performance pertaining to gases such as oxygen and carbon dioxide. It also enhances the barrier performance to ultraviolet rays, as well as adding strength, stiffness, dimensional stability, and heat resistance. New plastics created with this technology demonstrate an increased shelf life and are less likely to shatter. Once perfected, these plastics will offer these improved characteristics at competitive prices. It will also make them attractive for use in food and beverage packaging and pharmaceutical packaging applications.*

Introduction

In 2001, nearly 100,000 pounds of nanocomposite materials were used in the packaging industry; by 2011, the market in the United States is expected to be around 100 million pounds for rigid and flexible packaging (“Nanocomposites for packaging,” 2002). “Polymer nanocomposites consist of resins [either thermoset or thermoplastics] that have fillers added with a least one dimension measured in nanometers. These fillers fall into three categories: nanotubes, nanoscale oxides and metals, and nanoclays” (Brauer, 2003, ¶ 2).

Nanotube-based nanocomposites are used for electrostatic dissipation applications; nanoscale oxides and metals are used for abrasion-resistant films; and nanoclay-based nanocomposites are used for barrier packaging applications (Scott & Wood, 2003). “Nanocomposites have received considerable attention over the past decade because of their potential to achieve property enhancements significantly greater than that attainable using conventional fillers or polymer blends” (Dean, Abadalla, & Ganguli, 2003, p. 12). The use of nanoclay-based nanocomposites in food and beverage packaging applications, and the properties that make them superior to conventional plastics, will be focused on.

Background

Nanocomposites were first referenced in the 1950s and polyamide nanocomposites were reported around 1976. In the early 1980s Toyota's "Central Research and Development Labs began working with polymer-layered silicate-clay mineral composites and this is when the technology began to be studied more widely (Acquarulo & O'Neil, 2002). The clay mineral that is generating the most interest for use in nanocomposites is montmorillonite, generically referred to as nanoclay, and sometimes referred to as bentonite. "It is natural clay that is most commonly formed by the in situ alteration of volcanic ash or by the hydrothermal alteration of volcanic rocks" (Briell, 2004, ¶ 3). This clay is widely available and relatively inexpensive, thus becoming the most widely used clay in nanocomposite applications.

The first step in the preparation of the nanoclay involves purifying approximately 99 percent of the montmorillonite. The second step involves surface treatment of the clay. Montmorillonite is hydrophilic and relatively incompatible with most hydrophobic polymers, so it must be chemically modified to make its surface more receptive to dispersion (Capanescu & Capanescu, 2002). After the clays are chemically treated, they are dispersed in the polymer. The clays are incorporated into the polymer matrix by one of two approaches: during polymerization or by melt compounding (DeGaspari, 2001). This is the difficult part of the technology and may limit the use of nanocomposites (DeGaspari, 2001). The dispersion process requires a custom solution for each polymer used, so developing polymer nanocomposites becomes a capital intensive research and development project. Very few compounding firms have this kind of capability, and this leaves resin producers or well-funded startup companies to develop these materials ("Nanoparticle News," 2003).

Nanoclay Composites Create a Torturous Path

A nanocomposite behavior is entirely dependent on the size of the clay fibers added. The smaller and thinner the fiber, the more surface area is available to interact with the polymer matrix and an improved plastic. The size of the clay fibers has grown smaller, which means that even tiny amounts of filler (two percent of total volume) can be added to achieve the same effects (Buchholz, 2003). The nanoclays used in plastic composites are extremely small, irregular platelets. They are approximately one nanometer thick and 100 nanometers in diameter. A single human hair is 80,000 nanometers thick, so one can understand how a little goes a long way (Dambeck & Latzel, 2003). Once these tiny flat platelets are dispersed into

the plastic, they create a path that gases must follow to move through the material, greatly slowing their transmission (Demetrakakes, 2002).

Nanocomposites Deliver

“Today’s nanocomposites typically demonstrate unique improvements in materials properties, including rigidity, strength, and barrier characteristics, while maintaining a level of transparency and offering the potential for recyclability” (Acquarulo and O’Neil, 2002, ¶ 25).

Polymer-clay promise a veritable explosion of thermoplastic polymer applications because they are lightweight materials that rival metals in stiffness and strength while providing enhanced gas-barrier characteristics, superior dimensional stability, and high heat distortion temperatures – all with low mineral loading and virtually no loss in impact resistance (Chaiki, Leyva & Niyogi, 2003, p. 44).

Making this technology even more impressive is the fact that the properties improve with few penalties (such as higher density, brittleness, or loss of clarity) than with conventional reinforcements such as talc or glass (Leaversuch, 2001).

Nanocomposites Find a Niche in Food and Beverage Packaging

“Nylon is often touted as one of the most promising resins for nanocomposite additives” (Demetrakakes, 2002, ¶ 8). In packaging, the major application focus for nylon 6 nanocomposites is in high-barrier packaging. “Much of the attention is on PET bottles, where nanocomposites demonstrate an improved oxygen and carbon dioxide barrier” (Leaversuch, 2001, p. 66).

Honeywell’s “Aegis Role

Honeywell offers three grades of nanoclay nylon 6 resins; Aegis OX, HFX, and CSD. Aegis OX resin is an oxygen-scavenging nylon formulated for the high oxygen barrier demands of plastic beer bottles. “Honeywell has turned its attention to creating nano-nylon materials that can beat the cost of higher-barrier plastics or even glass” (Leaversuch, 2001, p. 67). The nanoclays act as the passive barrier and the nylon specific oxygen scavenger acts as the active agent (“There’s No Barrier,” 2004).

“Honeywell claims this one-two punch brings a 100 fold reduction in OTR versus nylon 6, taking oxygen ingress to near-zero levels” (Leaversuch, 2001, p. 67). Aegis OX demonstrates excellent resistance to delamination, it can be processed easily, has excellent clarity, is recyclable, and cost competitive (“There’s No Barrier,” 2004). Aegis OX is currently used in a three-layer PET bottle where it is the core layer for a 12-ounce premium beer bottle for Anchor Brewing of San Francisco (Leaversuch, 2003).

Honeywell's Aegis HFX Role

Aegis HFX is specifically formulated to address the growing requirement for improved delamination resistance in hot-fill bottle applications. It is a passive-active system that adds more oxygen resistance for foods. Customer trials have demonstrated that Aegis HFX meets shelf life requirements for hot-fill applications including juice, tea, and condiments (Leaversuch, 2003).

Honeywell's AEGIS CSD Role

For carbonated soft drinks, Aegis CSD provides delamination resistance during production. It also provides a high level of a passive carbon dioxide barrier compared with monolayer PET. "At 3.5 percent of bottle weight, Aegis CSD extends the shelf life of 0.5 liter bottles from 9 to 14 weeks. New data extends the shelf life to 16 weeks" (Leaversuch, 2003, p.53).

Honeywell's Specialty Film Roles

Films produced from Honeywell Specialty Polymers' provide excellent barrier properties to oxygen, flavors, and aromas. Each resin provides the extra performance needed for suitable films for a wide range of flexible packaging applications. They also provide toughness, strength, tear, and puncture resistance, and resistance to grease and gas penetration. Applications for this film include processed meat, fresh red meat, poultry, fish, cheese, dried food, and chilled fruit juices (Honeywell International, Inc., 2004).

Nanocor--Mitsubishi's Gas Chemical Company, Incorporated-- M9 Role

Nanocor has a different high barrier option. Through an alliance with the Mitsubishi Gas Chemical Company, Inc., Nanocor has rights to melt-compound its nanoclay additives with Mitsubishi's MXD6 nylon for use in barrier PET bottles and films under the trade name of "M9" (Leaversuch, 2003, p. 51).

Mitsubishi Gas Chemical Company, Inc. has supplied MXD6 plastics to the packaging market for 15 years. MXD6 features an excellent barrier for foods and beverages against harmful gases. It is preferred over competitive barrier plastics because it is easy to process and yields packages with high transparency. According to Peter Maul, President of Nanocor, said "M9 boosts the CO₂ and O₂ barrier of standard MXD6 respectively by 50 percent and 75 percent. The material also retains high clarity and delamination resistance equal to standard MXD6" (Leaversuch, 2003, p. 51). It is currently being used as the core of a three-layer 16-ounce non-pasteurized PET beer bottle and is said to have 100-fold lower OTR than that of straight PET. It also adheres to PET without tie layers and retains sufficient clarity to meet requirements for the amber bottle (Leaversuch, 2001).

M9's superior gas barrier provides flexibility in bottle design with a range of layer thickness to meet specific shelf life needs. Layer adhesion is virtually the same as standard N-MXD6, so it can be separated from PET by normal recycling methods. Because M9 is miscible with PET at layer thickness of five percent or lower, recyclers have the option of reprocessing thin-layer bottles in total, eliminating the separation step.

Rancor-Mitsubishi is able to extend the shelf life of a 28 gram weight PET bottle from 14 weeks to 21 weeks. They use the standard N-MXD6 with a five percent barrier layer of M9 due to its high carbon dioxide barrier (see Figure 1). The cut-off is at 90 percent CO₂ retention (Mitsubishi Gas Chemical CO., Inc., 2004).

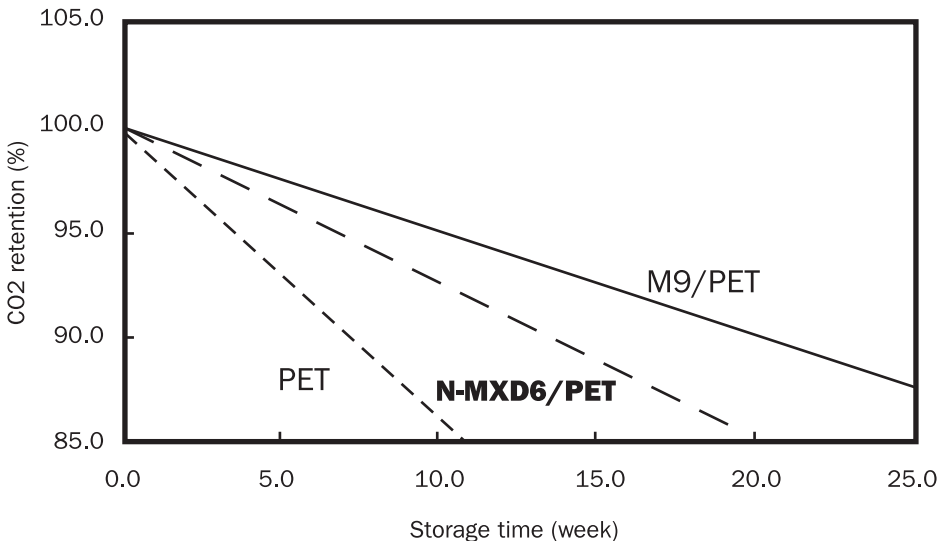


Figure 1. CO₂ Retention of Multilayer Bottle

Bayer's "Durethan Role"

Bayer's research team is aiming nylon 6 nanocomposites at cast film. It is referred to as a hybrid system that uses Nanocor's clay to reduce OTR by around 50 percent versus nucleated nylon. "Stiffness of the nanocomposite is doubled, and its gloss and clarity rival those of a costly high-clarity polyamide film. Anti-blocking properties are also improved" (Leaversuch, 2001, p. 67). The new film material with nanoparticles unites the advantages of EVOH and polyamide 6. The embedded particles prevent gases from penetrating the film and moisture from escaping. Durethan KU 2-2601 is suit-

able for applications where conventional polyamides are too permeable and EVOH is too expensive. Bayer's Durethan KU 2-2601 makes an ideal candidate as a plastic coating for paperboard juice containers. It can protect highly oxygen-sensitive package contents, such as orange juice, at a much lower cost (Bayer, Inc., 2003).

Triton Systems, Incorporated“ ORMLAS Role

Triton Systems, Inc. also has a class of commodity polymers that have been enhanced with organically modified nanoclays. These materials are sold under the trade name, ORMLAS, and have demonstrated improved barrier performance, impact resistance, as well as flame resistance (Triton Systems, Inc., 2004).

ORMLAS have been incorporated into a long-life food tray that offers high barrier performance and impact resistance. They also include high clarity, ease of manufacture, and recyclability (2004).

Nanoclay Resin Solution

In addition to its alliance with Mitsubishi, Nanocor offers its nanoclay resins to other converters for use in various consumer applications (see Figure 2). The dominant property improvement seen is a higher quality shelf life. This improvement can lead to lower weight packages because less material is needed to obtain the same, and if not better, barrier properties. This, in turn, can lead to reduced package cost. Improved shelf life and lower package cost are the reasons why nanotechnology is being pursued in consumer packaging (Nanocor, 2004).

Challenges

Real world applications for nanocomposites are coming slowly. There appears to be a reluctance to embrace this new technology due to cost and variability in the quality of some of the products (“Nanocomposites Prove,” 2002).

John Jones, a market development specialist at Honeywell, believes that manufacturers of these materials have to prove to the market that these new materials can meet their performance expectations (“Nanocomposites Prove,” 2002).

Another challenge nanocomposite producers face is the production of the nanocomposite itself. Both methods, pre-polymerization and post polymerization, for preparing nanocomposites have drawbacks. “Pre-polymerization production can disrupt the polymerization process, which is often critical and requires much developmental time and expense to achieve good

Nanocomposites Improve Package Properties

	IMPROVED SHELF LIFE	COST REDUCTION	HOT	STRENGTH	ODOR CONTROL	VITAMIN PRESERVATION	FLAVOR SCALPING	IMPROVED PRINTABILITY	CHEMICAL RESISTANCE
BOTTLES									
JUICE	X				X	X			
SOFT DRINKS	X								
CATSUP	X	X							
BEER	X					X			
VEGETABLE OIL	X								
BAGS & PACKS									
FATTY SNACKS	X								
SMOKED MEAT	X			X					
CHEESE	X			X					
BOIL-IN-BAG		X	X						
DOG FOOD	X			X	X				
ELECTRONICS		X							X
FILMS									
FRESH MEATS	X	X							
VACUUM-PACK CHEESE	X	X		X					
CARTONS									
JUICE	X	X			X	X			
MISC.									
SOUP LIDS			X				X		
STAND-UP-POUCHES		X					X		
MICROWAVE TRAYS	X		X						
SAUSAGE CASINGS		X							
AEROSOL CAN LINERS		X							
BUBBLE WRAP		X							X
ANTI-FREEZE CONTAINER		X							
CIGARETTE WRAPPERS	X		X						

Figure 2. Nanocomposite Consumer Packaging Applications versus Property Improvements (Nanocor, 2004)

yields and controllability, and post polymerization often requires a lot of time to achieve a good dispersion of the nanoparticles in the composite” (“Nanoparticle News,” 2003, p. 4). This then becomes an expensive and low cost-competitive initiative.

Another concern deals with equipment conversion that accepts new material through recalibration; this is a big investment for converters to make (Demetrakakes, 2002).

It’s a complicated process to go from plastic pellets to a blown bottle. It requires heating and blowing that form to the shape of the bottle. This is expensive equipment, very high-speed equipment, designed for the material that you’re going to run. You can’t just take another material with different flow characteristics, crystallization rate, and those kinds of things, throw that in there and make it run (Demetrakakes, 2002, p. 23).

Conclusion: Nanocomposites Advance into the 21ST Century

Today, nanocomposite research is widespread and is conducted by companies and universities across the globe. Plastic suppliers who have already commercialized nanocomposite materials include Basell USA, Bayer, Dow Chemical, Eastman Chemical, Mitsubishi Gas Chemical, Nanocor, Triton Systems, Honeywell, and RTP Co. ("Cutting Edge," 2001). Most of these efforts are currently focused on either polyolefins or nylons, but, in theory, the clay nanoparticles could be used in any resin family.

Optimism surrounding these novel materials has increased since they burst into industry consciousness two or three years ago, and exploratory effort has intensified as a growing body of data substantiates the potential established by nylon/clay nanocomposites, emerging polyolefin versions, and a range of other resin matrixes and nano-fillers....the promise of nanocomposites is undiminished (Leaversuch, 2001, p. 64).

It appears that the momentum is building. The success of Honeywell, Mitsubishi Gas and Chemical, Bayer, Triton Systems and Nanocor will lead to other successes. As production reaches a sufficient scale, incorporating the clay into polymers will become more cost-effective as well. Equipment recalibration used for conventional plastic resins will also show success.

The popularity of nanocomposites comes from the fact that a little goes a long way. It provides a marked increase in oxygen, carbon dioxide, moisture and odor barrier properties, increased stiffness, strength and heat resistance, and maintains film clarity and impact strength. For the packaging industry, these new materials and their commercial applications are coming into focus.

References

- Acquarulo, L.A., Jr. & O'Neil, C.J. (2002, May). Enhancing medical device with nanocomposite polymers: Advances in compounding medical plastics with nanoclay filters are pushing the materials envelope for minimally invasive devices. *Medical Device & Diagnostic Industry*. Retrieved March 20, 2004, from <http://www.devicelink.com/mddi/archive/02/05/00.html>
- Bayer, Inc. (2003). *Securely wrapped nanoparticles make Durethan films airtight and glossy*. Retrieved February 16, 2004, from <http://www.research.bayer.com/edition/polyamides.php>

- Brauer, S. (2003, November). The polymer nanocomposites industry. *Nanoparticle News*, 6, 10. Retrieved February 16, 2004, from Lexis Nexis database.
- Briell, B. (2000). *Nanoclays- counting on consistency*. Retrieved February 10, 2004, from <http://www.nanoclay.com/pubs/Nanoclays%20-%20Counting%20on%20Consistency.htm>
- Buchholz, K. (2001). Nanocomposites debuts on GM vehicles. *Automotive Engineering International Online*. Retrieved February 9, 2004, from <http://www.sae.org/automag/>
- Capanescu, C. & Capanescu, I. (2002). Nano-clays in polyester gelcoats. *Paint and Coatings Industry*. Retrieved February 16, 2004, from http://www.pcimag.com/CDA/ArticleInformation/features/BNP__Features__Item/0,1846,78343,00.html
- Chaiko, D., Leyva, A., & Niyogi, S. (2003, June). Nanocomposite. *Advanced Materials & Processes*. Retrieved February 16, 2004, from EBSCOhost database.
- Cutting Edge. (2001). *Appliance Design*. Retrieved February 16, 2004, from http://www.appliancedesign.com/CDA/ArticleInformation/features/BNP__Features__Item/0,2606,28320,00.html
- Dambeck, T., & Latzel, M. (2003). Little volcanic helpers. *Clariant*. Retrieved February, 2004, from [http://www.clariant.com/corporate/discover.nsf/files/d09downloads/\\$file/report_volcanic_helpers.pdf](http://www.clariant.com/corporate/discover.nsf/files/d09downloads/$file/report_volcanic_helpers.pdf)
- Dean, D., Abdalla, M., & Ganguli, S. (2003). Big things in small packages. *Adhesives Age*, 46, 3. Retrieved February 16, 2004, from EBSCOhost database.
- DeGaspari, J. (2001). Prospecting paydirt. *Mechanical Engineering*. Retrieved February 16, 2004, from EBSCOhost database.
- Demetrakakes, P. (2002). Nanocomposites raise barriers, but also face them: Clay-based additives increase the barrier qualities of plastics, but obstacles to commercialization must be overcome. *Nanocomposite Materials*. Retrieved February 16, 2004, from http://www.findarticles.com/p/articles/mi_m0UQX/is_12_66/ai_96123509
- Honeywell International, Inc. (2004). Honeywell Capran ® Films: Flexible packaging. Retrieved February 16, 2004, from http://www.honeywell.com/sites/sm/capran/flexible_packaging.htm
- Leaversuch, R. (2001). Nanocomposites broaden roles in automotive, barrier packaging. *Plastics Technology*, 47,10. Retrieved February 16, 2004, from EBSCOhost database.

- Leaversuch, R. (2003, March). Barrier PET bottles. *Plastics Technology*. Retrieved February 16, 2004, from <http://www.plasticstechnology.com/articles/200303fa2.html>
- Mitsubishi Gas Chemical CO., Inc (2003). *Multilayer containers featuring nano-nylon MXD6 barrier layers with superior performance and clarity*. Retrieved February 16, 2004, from www.Nanocor.com/tech_papers/NOVAPACK03.pdf
- Nanocomposites prove a little goes a long way toward improving barrier while maintaining film clarity. (2002). *Packaging Strategies*, 20, 13. Retrieved February 16, 2004, from Lexis Nexis database.
- Nanocor. (2004). *Commercial Applications*. Retrieved on February 16, 2004, from http://www.nanocor.com/app_pkg.asp
- Nanoparticle news: Barriers to increased production. (2003, November). *The Polymer Nanocomposites Industry*, 6, 10. Retrieved February 16, 2004, from Lexis Nexis database.
- Orientated Films for Flexible Packaging (2002). *Nanocomposites for packaging: New frontiers and future opportunities*. Retrieved January 12, 2005, from http://www.packstrat.com/FILES/HTML/Marketing_and_Tech_Studies/studies-library/0,8001,,00.html#nanocomposites
- Regalado, J. (2003). *Supporters hope law will boost nanotechnology*. *The Wall Street Journal*, B4. Retrieved February 16, 2004, from ProQuest database.
- Scott, A. & Wood, A. (2003). Big firms bulk up on nanoscale materials. *Chemical Week*. Retrieved February 16, 2004, from www.findarticles.com/Cf_0/m3066/36_165/108969282/print.jhtml
- There's no barrier to innovation at Honeywell. (2004). *Aegis*. Retrieved February 16, 2004, from <http://www.honeywell-plastics.com/main/misc/feature.cfm>
- Triton Systems, Inc. (2004). Retrieved on February 16, 2004, from <http://www.tritonsys.com>

Work Team Conflict Resolution

Randy Kerr

Undergraduate Student, Training Systems in Business & Industry

Key Words: conflict, resolution, communication, teams, groups, disagreements, perception, negotiation, workforce

Abstract: *As organizations continue to restructure to work teams, the need for training in conflict resolution will grow. Conflict arises from differences. When individuals come together in teams, their differences in terms of power, values, and attitudes contribute to the creation of conflict. To avoid the negative consequences that can result from disagreements, most methods of resolving conflict stress the importance of dealing with disputes quickly and openly. Conflict is not necessarily destructive; however, when managed properly, conflict can result in benefits for a team. This article takes a look at some established steps that will assist students to effectively deal with work teams in the class room and with group members having different view points. These simple guidelines will make the difference between failure and success.*

Work Teams

Over the past decade, almost all colleges and major corporations have implemented the work team system of management. The major reason for this shift is that a team has more diversity of knowledge, ideas, and experience than any one individual. This diversity has helped to increase productivity and reduce cost; however, this diversity also produces conflict. Varney (1989) reports that conflict remained the number-one problem for most of the teams operating within a large company even after repeated training sessions on conflict resolution and learning how to minimize the negative impact on team members. Varney's research illustrated that managers and other leaders are not giving conflict resolution enough attention. It is critical that all team members possess conflict resolution skills.

Conflict is an every day part of life and arises from individual differences. When individuals work in teams, differences in power, values, attitudes, and social factors all contribute to conflict. Conflict can arise from

numerous sources within a team setting and generally falls into three categories: communication factors, structural factors and personal factors (Varney, 1989). Communication factors include poor listening skills, insufficient sharing of information, differences in interpretation and perception, and nonverbal cues being ignored or missed. Structural disagreements include the size of the organization, turnover rate, levels of participation, reward systems, and levels of interdependence among employees. Personal factors include bigotry, racism, and shyness. These three barriers to communication are among the most important factors and can be a major source of misunderstanding.

Conflict in work teams is not necessarily destructive. Depending on the situation, the conflict may be seen as negative or positive. Conflict can lead to new ideas and approaches to organizational processes and increased interest in dealing with problems. Conflict can be considered positive as it facilitates the surfacing of important issues and provides opportunities for people to develop their communication and interpersonal skills. However, conflict becomes negative when it escalates to the point where people begin to feel defeated, and a combative climate of distrust and suspicion develops (Bowditch & Buono, 1997). Nelson (1995) cautions that negative conflict can destroy a team quickly, and often arises from poor planning. He suggests the following list of high potential areas from which negative conflict issues commonly arise:

1. Administrative Procedures: If the team lacks good groundwork for what they are doing, its members will not be able to coordinate their work.
2. People Resources: If the team does not have enough resources to do the job, it is inevitable that some members will carry too heavy of a load. Resentment, often unexpressed, may build; therefore, it is crucial that team leaders ensure adequate resources.
3. Cost overruns: Often inevitable, cost overruns become a problem when proper measures are not taken. The entire team should be aware, early on, when cost becomes a problem so additional funding can be sought by the team. Therefore, the problem can be resolved before it grows into a problem for management.
4. Schedules: The schedule is highly consequential to the team's project and should be highly visible. All members should be willing to work together to help each other meet their deadlines.

5. Responsibilities: Each team member must know their assigned areas and be accountable for them.
6. Wish Lists: Team members must stick to the project at hand and avoid being sidetracked into trying to fit other things into their schedules. Wait and do the other things you would like to do after successful completion of the original project (Nelson, 1995).

Team members can and should attempt to keep negative conflict from occurring. Being aware of the potential for negative conflict and taking the necessary steps to ensure good planning will help the situation. When negative conflict does occur, there are five accepted methods for handling it: Direct Approach, Bargaining, Enforcement, Retreat, and De-emphasis (Nelson, 1995). Each can be used effectively in different circumstances.

1. Direct Approach: This may be the best approach of all. It concentrates on the leader confronting the issue head-on. Though conflict is uncomfortable to deal with, it is best to look at issues objectively and to face them as they are. If criticism is used, it must be constructive to the recipients. Because issues are brought to the surface and dealt with, this approach counts on the techniques of problem-solving and normally leaves everyone with a sense of resolution.
2. Bargaining: This is an excellent technique when both parties have ideas on a solution but yet cannot find common ground. Often a third party, such as a team leader, is needed to help find the compromise. Compromise involves give and take on both sides, and usually ends up with both walking away equally dissatisfied.
3. Enforcement of Team Rules: Avoid using this method if possible because hard feelings often develop toward the leader and the team. This technique is only used when it is obvious that a team member does not want to be a team player and refuses to work with the rest of the group. If enforcement has to be used on an individual, it may be best for that person to find another team.
4. Retreat: Only use this method when the problem isn't real to begin with. By simply avoiding it or working around it, a leader can often delay long enough for the individual to cool off. When used in the right environment by an experienced leader, this technique can help to prevent minor incidents that are the result of someone having a bad day from becoming real problems that should never have occurred.

5. De-emphasis: This is a form of bargaining where the emphasis is on the areas of agreement. When parties realize that there are areas in which they agree, they can often begin to move in a new direction (Nelson, 1995).

Team Resolution Process

When conflict occurs in teams, Rayeski and Bryant (1994) recommend using the Team Resolution Process. The process states that a conflict should first be handled on an informal basis between the involved team members; this allows time for resolution or self-correction to occur within the team. If the conflict remains unsettled, a mediator can be brought in to help resolve the situation. The next step would be to openly discuss the dispute in a team meeting. Finally, if a resolution is still not achieved, a formal discipline process needs to occur with the team.

Negotiation

Although there are common patterns, there is no one best way to deal with conflict. Disputes arise for different reasons and every team is unique. Varney (1989) proposes that negotiation is the most effective response to conflict when both parties involved stand to gain something. Each individual has some power and interdependency. Negotiation offers flexibility and viability where as other responses such as Avoidance, Confrontation, and Diffusion may lack. The process of negotiation involves listening to both sides, seeking out common areas of interest and agreement, and building on them so that individuals can understand each other's points of view.

For individuals to work effectively in teams, they must be able to clearly communicate their ideas, listen, and be willing to disagree. Although it may be difficult, learning to appreciate each other's differences reflects a team's ability to manage conflict. When conflict occurs, one should not turn their back and hope it will go away. Instead, one must learn to tolerate and even welcome it. Well-managed conflict can be the source of change and innovation. As more and more organizations attempt to make the difficult transition to teams, they must develop and provide conflict management training programs for their employees.

References

- Bowditch, J. L., & Buono, A. F. (1997). A primer on organizational behavior (4th ed.). New York, NY: JohnWiley & Sons.
- Nelson, M. (1995). Interpersonal team leadership skills. *Hospital Material Management Quarterly*, 16 (4), 53 - 63.
- Rayeski, E., & Bryant, J. D. (1994). Team resolution process: A guideline for teams to manage conflict, performance, and discipline. In M. Beyerlein & M. Bullock (Eds.), *The International Conference on Work Teams Proceedings: Anniversary Collection. The Best of 1990 - 1994* (pp. 215 - 221). Denton: University of North Texas, Center for the Study of Work Teams.
- Varney, G. H. (1989). *Building productive teams: An action guide and resource book*. San Francisco, CA: Josey-Bass, Inc.

Packaging Redefines Fresh Breath

Laura Lee Lentner

Undergraduate Student, Packaging

Key Words: packaging, small-scaled, advertising

There is a buzz around town that is putting packaging in high demand. The buzz comes from the unique -looking, handheld breath freshening packages that are setting new trends and growing in popularity every day. The success of these products is visible in the checkout lane of many retail stores throughout the country. From mint-holding tins to gum-suspending blister packs to snap-cap closures (measuring the size of a postage stamp), consumers get the urge to carrying around his or her favorite fad package. While this is occurring, companies are reaping the benefits of increasing sales.

Breath fresheners, which include an array of gums and mints, have experienced a rapid boost in sales. This is largely due to the new life and attitude that packaging has brought to an industry that was once considered substantial (but is considered to be unending in possibilities). Packaging has provided a new wave of product benefits. Aside from casing the product, packages are innovative and stylish, small scaled and portable, and hygienic with controlled product dispensing.

Along with improvements in packaging, new products such as breath strips and gel-mints, have also contributed to the surge in breath freshener popularity. Within one year, sales of breath strips went from \$33 million to \$225 million (Francella, 2004, p.4). Gel mints have also dominated the market, prompting new packaging designs and double-digit sales growths (Higgins, 2003, p.16).

As new product popularities have broken boundaries and exceeded expectations, overall sales of breath fresheners have skyrocketed. Sales have climbed an unexpected 41% since 1997 (Roberts, 2003, p.1). In 2003, breath fresheners hit a market high bringing in \$3.4 billion in sales (Francella, 2004, p.1). If product demands continue to flourish, the industry has expectations to reach sales of \$4.7 billion by 2007 (Roberts, 2003, p.2). As sales have risen, so have the number of packages that cause these high-demanding products. Breath fresheners are flooding the market. In the last 10 years,

it has been apparent that packaging has made its mark in the breath freshener industry.

Consumers have been exposed to breath fresheners for more than a century. Aside from product line expansions, such as sugar-free gum and extra strength mints, the chemical make-up of breath fresheners has not changed drastically since their existence. To sell a product that has ultimately been the same for generations, companies are turning to packaging to promote their product. Packaging is used to appeal to target audiences and re-excite consumers into thinking they are being exposed to these products for the first time.

When breath fresheners were first produced, they appealed to young and middle-aged adults. This age group was to credit for the majority of sales. As new breath freshener brands have been created, the packaging has improved and has appealed to greater target audiences of all ages. – Unique plastic containers with hologram labels containing IceBreaker® liquid mints appeal to pre-teens. Whereas sophisticated tins, casing Altoids® (breath mints), appeal to adults. Consumers of all ages, pre-teens to the mature adults, are now to credit for the recent jump in breath freshener consumption and sales.

Mintel, a consumer research company in Chicago, has done extensive studies on breath freshener consumption. Its studies show that 95% of children, ages 6 to 17, and 89% of young adults, ages 18 to 24, consume breath fresheners on a regular basis (Roberts, 2003, p.2). To captivate the interest of this age group that changes opinions frequently, packages need to be up-to-date and it must fit their lifestyle. Considering many teens wear jeans, packages need to be created small enough to fit into pockets of the tightest pants.

Looking at the rest of the population, 80% of adults and 68% of the older population, ages 65+, use gums and mints (Roberts, 2003, p.2). To meet the interest of this age group, packages are being made out of tin to bring an “older fashion appeal to demographic groups that grew up with tin band-aide holders and coffee cans.

There are hundreds of reasons why consumers use breath fresheners. According to Mintel research, the obvious and most popular reason is to freshen breath (Roberts, 2003, p.4). Users who fall into the need for fresh breath are smokers, coffee drinkers, and on-the-go eaters (Francella, 2004, p.4). For years, smokers have consumed mints to rid the smell of smoke from their breath, and have used gum to substitute for their addiction in non-smoking environments. In recent years, coffee shops have expanded to new areas, and the lifestyles of Americans have quickened, causing a greater need to rid coffee breath.

As audiences demanding fresh breath have grown, companies have tailored their packaging to meet consumers' needs. Smokers can fit a breath strip package easily into their pocket so others are not aware of their habit. Coffee drinkers can easily open a square-shaped tin and select the number of mints needed to cover-up their caffeine addiction. On-the-go eaters can pop a piece of gum out of a blister pack after eating a sandwich with onions, and not have to worry about throwing away a wrapper while they are walking back into the office. Packaging has made breath fresheners a convenient product to consume.

The packaging appeal that has increased the popularity of breath fresheners has influenced many companies to jump on the bandwagon. Individual entities like Kate Spade®, Donna Karan®, and Starbucks® are creating their own line of mints (Sullivan, 2003, p.60). Larger companies like Wrigley® Jr., Hershey® Foods, and Masterfoods USA® are taking action and adding line extensions to their existing product lines in order to capitalize on an industry that is booming in revenues.

A big shock to the breath freshener industry occurred when Wrigley Jr. Company launched its first non-chewing gum product after a 111-year history of providing consumers solely with chewing gum products (Hollingsworth, 2003, p.20). The breath strip product, Eclipse® Flash Strips™ in a small-sized container, was one of the most successful breath mint launches. It is now a common item among the array of breath fresheners in the checkout lane.

The craze of breath strips that attracted Wrigley Jr. to endeavor into a new breath freshener domain began in 2001. Pfizer® Consumer Healthcare launched the first ever breath strip known as Listerine® PocketPaks™, and was awarded The Most Innovative Product of the Year award in 2002. Since then, many companies have launched copycat products in attempt to reap the same benefits as Pfizer did in its \$112 million first year sales (Hollingsworth, 2003, p.20).

The packaging of breath strips is as impressive as the product. The small-scaled package, that is roughly the same size as the product, protects the delicate films from cracking or breaking during the careless storage in purses, pockets, and backpacks. It is easy for consumers to slip a breath strip package into the pocket of a carry-along while he or she is away from home. The resealable package allows the consumer to select as many strips as desired. Aside from size, durability, and convenience, the package also has a large enough billboard to advertise the product. Imagining breath strips in a paperboard box or tin could not compare after observing the success the product has had in the plastic flip-top package.

Breath strips are one of many new entries into the breath freshener category within recent years. Other new product lines are Cadbury's® Dentyne Ice™ and Wrigley's Jr.'s Orbit™ gum, which both exhibit characteristics of an enhanced Chic-let. These new oral-care products brought with them the introduction of blister packs into the breath freshener industry. Comparing the new to the old, and looking at blister packs against the now deemed old fashion paper wrappers, makes one wonder how it could have been possible without them.

Blister packs, hosting 12 pieces of gum, are paper thin compared to the bulging 15-stick packet. As pieces are popped out of a blister pack, one at a time, the remaining stay stable in their individual compartments. When sticks of gum are pulled from the packet, the remaining pieces loosen and end up spilling out into purses and glove boxes. Who would have thought paper labels could be so messy.

Dentyne Ice and Orbit gum have a hard-shell coating that acts as double protection with their plastic packaging. Unless a consumer steps on the product or puts an extreme amount of pressure on the package, gums such as these will not lose their shape. On the opposite end of the spectrum, stick gum is easily susceptible to crushing. The slightest amount of pressure on a purse or backpack will squish the paper package and reshape the product, taking away its chewing appeal.

The combination of plastic packaging and the hard-shell coating of Dentyne Ice and Orbit gum make these products temperature resistant. This is a huge advantage over stick gum, which is not chewable in extreme temperature conditions. Many consumers can relate to the experience of stick gum in summer heat. When exposed to the sun, stick gum adheres to the wrapper making it a sticky mess and impossible to chew. Stick gum also loses its chewable texture in cool temperatures. With paper wrappers, a slight tear in the package exposes the product to the outside environment, causing it to lose freshness and become stale quicker.

It is no wonder why blister packed gum is doing so well. It has redefined the product and has made it more durable than ever imagined. Blister packs have clearly become the breath freshener package of today, leaving paper wrappers far behind. Gum is not the only breath freshener found in blister packs. Binaca® uses blister packs to case their Gel Burst™ mints in order to avoid the risk of the beads sticking together in hot and humid temperatures. Product manager Standhart stated "The blister pack was needed in order to meet tough quality standards and may make for happier consumers this summer" (Berk, 2004, p.2).

Binaca is one of the many companies that have experimented with liquid mints. Hershey Food Corporation ventured into the breath freshener industry in 2000 when the company bought IceBreakers Liquid Ice mints from Nabisco® (“Hershey Annual Report,” 2004). Liquid Ice mints are sold in an innovative, flip-top plastic container that is smaller than the palm of most people’s hands. Whether it is the favoritism in their products or their packaging, Hershey’s net sales rose to \$1.907 billion in the second quarter of 2004 from \$1.802 billion in the first half of 2003 (“Hershey Annual Report,” 2004). The ramped craze of breath fresheners which have contributed to the impressive sales of Icebreaker brand products is partially to thank for Hershey’s success.

Masterfoods USA is another company that took a bite into the soaring industry of liquid breath fresheners. They introduced hydrating mints known as AquaDrops™ at the end of 2003 and claimed the product could quench thirst during dry mouth moments (Beirne, 2003, p.14). Though AquaDrops are different from other breath fresheners, it is packaged in the familiar blister pack. This is a prime example of one company using an innovative packaging concept that has caused other companies to follow suit.

Existing companies like Altoids have come out with new products, as well as new package designs. Altoids, which were once sold in a rectangular-shaped tin with a pop-off top, can now be bought in various tin sizes: the largest being the size of a VHS, the smallest being the size of a small notepad. The shapes of the tin package range from rectangles to triangles to hearts. Some container lids detach from the base while others remain attached by a hinge. The variability in tin sizes and shapes promotes the variability in products from mints to gums to breath strips. Altoids have also done promotional packages featuring tins with popular cartoon characters and classic Christmas characters like Rudolph the Red Nose Reindeer and Santa Clause exhibited on the lid (Beirne, 2003, p.14).

The addition of new products, with improvements in packaging, has made advertising in breath freshener industry more critical than ever before. Breath fresheners are advertised more heavily today than in the past. Companies are using multiple forms of advertising from trendy magazines such as Vogue and Cosmopolitan, to billboards in Times Square, to internet ads and online pop-up windows (“U.S. Market,” n.d.). Hershey conducted a national television promotion to support the launch of their IceBreaker Liquid Ice mints, and handed out 10 million sample packs at Jessica Simpson’s 2004 tour (“Jessica Simpson Now”, 2004).

Masterfoods USA introduced AquaDrops in the United Kingdom through television, the press, public relations, and outdoor sampling campaigns (“Masterfoods: Digesting,” 2004). Binaca created a print campaign exposing their Gel Burst Liquid mints to readers of *Fitness* and *Men’s Health* magazines (Berk, 2004, p.2).

With breath freshener competition becoming cutthroat, companies are putting no limitations on their advertising budgets. Pfizer dedicated a \$40 million budget to promote the world’s number-one breath strip seller Listerine PocketPaks. Cadbury spent \$14 million of their \$20 million Dentyne marketing budget on TV ads to push their newest gum flavor release, Fire™. Trident® also turned to TV and spent \$20 million on their TV ad campaign to inform American households of their latest new Cool Rush™ flavor (Beirne, 2004, p.14). With the desire to push products on TV, companies like Hershey Foods take the extra expense and hire celebrities like Jessica Simpson to advertise their products on TV and during concert tours (“Jessica Simpson Now...,” 2004).

The extreme extent of advertising expenses has increased venue exposure. Up until the late 1980s, breath fresheners were mostly found in the checkout lanes of supermarkets, convenience stores, and gas stations. Now they are everywhere; in hotels, restaurants, nightclubs, and coffee shops (Berk, 2004, p.2). They can even be found in the fitting rooms of retail stores like Victoria Secret and Barneys (Hollingsworth, 2003, p.11). Companies are also turning to high profile events to get their products favored by celebrities without paying the high price of advertising. Anthony Shurman, president of Yosha! Enterprises, was able to put his Momints Liquid mints in celebrity goodie bags at the Sundance Film Festival (Berk, 2004, p.1). With trendy avenues offering uniquely packaged breath fresheners, carrying around the package has become as trendy as consuming the product.

Though venues of breath fresheners have become unlimited, the most valuable location for retailers is still the checkout lane (Higgins, 2003 p.16). According to a 2003 Front-End Focus Study sponsored by Masterfoods USA, Time Distribution Services, and Wm. Wrigley Jr., in partnership with Dechert-Hampe & Co., gum, mints and candy are the number one items consumers want to see while standing in the checkout lane (Kruger, 2003, p.18). Here, consumers are attracted to the striking display of the latest products cased in flashy, colorful and innovative packages. Confectioner Magazine classifies these products as being “high penetration, high frequency, and high impulse” to gullible consumers that cannot say no temptation (Kruger, 2003, p.18).

Of the impulse sales occurring at checkout lanes, gum and mints lead the pack by 72% of sales based on 2003 sales figures (Kruger, 2003, p.18). With this advantage, more companies are focusing on innovative packaging to further promote their traditional mints and century-established gums. Higgins of Food Packaging (2003) stated, “Bold flavors are hot, particularly in the adult market, and the package is the cue that the product inside has punch” (p. 2).

The perception of an added punch is mandatory in an industry where spearmint and peppermint gum essentially taste the same, regardless of the brand. Product variety is limited in the breath freshener industry. Therefore, packaging is the added advantage companies can use to say their product is the best. The desire for companies to create the next best package that puts their product over the edge has turned breath fresheners into a fad business. Berk (2004) stated, “...some say Gel Bursts’ packs aren’t as hip as their competition, which could be a drawback in the trendy category” (p. 1).

Whether waiting in line at a checkout lane or for a fitting room in a department store, it is not hard to find a product that will freshen breath. From gum to mints to breath strips, there has been a clear increase in the magnitude of breath fresheners. The increase in quantity of products has been followed by an increase in the quality of packaging. The high demand for innovative packaging in the breath freshener industry has influenced the popularity of the product, making companies wonder if consumers are purchasing the package for the product or the product for the package.

References

- Beirne, M. (2003). Strip-Mining slows, low-carb pitches grow. *Brandweek*, 14.
- Berk, C.C. (2004). The Pitch: Liquid mints freshen a stale product category. Retrieved November 14, 2004, from www.momints.net/images/news/DowJones42904.pdf
- Francella, B.G. (2004). *Breath of fresh air*. Retrieved November 14, 2004, from http://www.csnews.com/csnews/reports_analysis/feature_display.jsp?vnu_content_id=1000507335
- Higgins, K.T. (2003). Bold flavors and containers at checkout. *Food Packaging*, 75 (5), 16.
- Hershey Annual Report. (2004). Retrieved November 12, 2004, from <http://www.hersheys.com>
- Hollingsworth, P. (2003). Don't hold your breath. *Food Technology*, 56 (11), 20.
- Jessica Simpson now Hershey's dumb blond. (2004). Retrieved November 12, 2004, from http://www.brandweek.com/brandweek/headlines/article_display.jsp?vnu_content_id=1000512180
- Kruger, R.M. (2003). *Candy at the front lines*. Retrieved November 19, 2004, from http://216.109.117.135/search/cache?p=master-foods+%2B+mints&ei=UTF-8&u=www.ecrmepps.com/Expose/V7_11/18.pdf&w=master-foods+mints&d=81F3C74272&icp=1&.intl=us
- Masterfoods: Digesting Hydration. (2004). Retrieved November 14, 2004, from http://www.food-business-review.com/article_feature.asp?guid=BF2837EB-0484-4898-9A2C-58CFCD758ABB
- Roberts, W.A. (2003). *Market trends category analysis: An air of fresh breath*. Retrieved November 14, 2004, from http://www.preparedfoods.com/CDA/ArticleInformation/features/BNP_Features__Item/0,1231,113148,00.html
- Sullivan, R. (2003). I want candy. *Vogue*, 193(7), 59-60.
- U.S. Market for Gum, Mints and Breath Fresheners: Volume 3. (n.d.). Retrieved November 14, 2004, from <http://www.mindbranch.com/listing/product/R567-0021.html>

The Effects of Simultaneous Paring of Auditory and Visual Stimuli And Visual Stimuli in Short-term Memory

Jonathon Wood and Emmalee Eriksen

Undergraduate Students, Psychology

Key Words: memory recall, audio, visual

Abstract: *The current study looked at the effects of the simultaneous paring of auditory and visual stimuli in short-term memory recall. The study contained three conditions; visual stimuli only, auditory stimuli only, and the two stimuli simultaneously combined. The participants were a sample of 60 undergraduate students at the University of Wisconsin-Stout, which consisted of 30 males and 30 females. A 3x2 factorial design was used divided by sex and the stimulus condition. Each participant was presented with a slide show and later asked to free recall. Results showed that simultaneous pairing significantly yielded more items recalled than both of the isolated stimuli. Therefore, it can be concluded that the combination of auditory and visual cues can lead to improved short-term memory storage and retrieval. Significance in the classroom and work training sessions are discussed.*

Introduction

A person's short-term memory is in constant use in his or her everyday life. It is used to remember what has just been read in the last sentence, or even to remember where something was placed a moment ago. It is difficult to find a life task that does not require the use of short-term memory storage and encoding. One situation in which short-term memory is in constant use is in the school setting. In fact, traditional education has focused on memorization for centuries. Even the task of remembering what was written on the board, long enough to write it in a notebook, is a function of the short-term memory. Since this function of the brain is so commonly used, there has been much research regarding short-term memory. If, through research, one could find a way to improve short-term memory, or at least better understand it, it could have implications in every aspect of many individual's daily lives. This is why the topic of memory is so common in psychological research.

Short-term memory plays a key role in the mundane functions of people's everyday lives. According to Shallice (1982), however, people also rely on short-term memory for higher order operations such as problem solving, troubleshooting, and developing plans. The involvement of short-term memory in these processes is known as the Supervisory Attentional System. With this in mind, it is apparent that short-term memory is an extremely important aspect in dealing with surroundings. Consequently, it is important to study implications of short-term memory in the realms of adjustment, adaptation, education, and development. Psychologists aim to understand what affects a human's abilities to process, store, and encode new information. The first step of gaining this understanding is to identify the key variables of short-term memory. The second step is to determine how the variables affect one another.

As noted before, it is difficult to avoid situations where we are presented with new information that is only relevant for a short time. When we take in this information we either soon forget it or we retrieve the information needed to process and perform the intended function. For example, when a person meets a new group of people in a temporary social or business setting, it is important to remember each of their names during the time spent with these people. After the group parts ways, there may no longer be a reason to remember the newly learned names, so the names are forgotten. Human brains strive for efficiency, so information such as a temporary acquaintance's name becomes lost. This is due to the fact that it is no longer necessary to store that information.

For most, short-term memory operations, such as remembering a new acquaintance's name, comes naturally and is relatively easy. During the limited time spent with that person, recalling his or her name is second nature. Memory retrieval processes, that people do not realize are happening, are known as implicit memory. Information can become a part of implicit memory by way of familiarity or repetition, or by the level of processing involved in storing the information. In meeting an individual and recalling his or her name, people process the new information according to a variety of stimulus cues. One most likely looks at his or her face and stores a visual representation of the new acquaintance. The person then says his or her name, which gives a label to the visual representation and an auditory stimulation to store to other person's brain. Hearing the name not only labels the face in the brain, but also gains another identifying cue, that person's voice. A simple introduction offers a variety of information to be stored within short-term memory that, in turn, renders the task of remembering the person and the associated cues, for the brain. The question posed in this research is

The Effects of Simultaneous Pairing of Auditory and Visual Stimuli And Visual Stimuli in Short-term Memory

how strong of an effect pairing a visual stimulus with an auditory stimulus has on a human's short-term memories?

Although the relationship between visual imagery and memory has been studied quite thoroughly, auditory association has been less explored, especially auditory associated with visual words. A study by Haan et al.(2000), examined memory in four conditions including visual words combined with hearing an associated auditory, visual word with the subject repeating the word, visual word combined with subject writing the word down, and finally simply the visual presentation. "The results show a similar memory performance in all conditions in which subjects did not hear the words (either via auditory presentation or via their own vocalization), fewer words were remembered" (Haans et al., 2000, p. 577). In a related study by Sharps and Price (1991), the mnemonic value of auditory imagery is examined by comparing visual pictures linked with auditory to simply visual pictures alone. Findings showed, "Pictures and characteristic sounds were associated with significantly better recall than were verbal labels alone, indicating that auditory imagery has mnemonic value similar to that of visual imagery" (p.81). Burrows and Solomon (1975) conducted research that examined the reaction time of free recall under conditions of auditory and visual stimuli alone, as well as combined. Results showed "that the paired stimuli yielded shorter reaction times than isolated stimuli" (p. 416). These results appear to support the connection between auditory and visual stimuli and the increase of short-term memory. This study used reaction time as the dependant variable whereas the following study examines the dependant variable of number of words recalled in the same conditions.

The aim of this research is to determine if pairing visual and auditory stimuli will have an effect on short-term memory when compared to an isolated stimulus. It is hypothesized that the data will show the number of items recalled will significantly increase when auditory and visual stimuli are displayed simultaneously (compared to when each stimulus is isolated). It was also hypothesized that the isolated auditory condition will result in the lowest amount of memory recall. If the hypothesis is correct, the results could be generalized to many situations and disciplines. Some specific situations this research could impact are that of the classroom learning environment, work training situations, and general social encounters. If it is determined that auditory stimuli linked with visual stimuli significantly improves short-term memory, it could be a great tool for teachers and employers alike to use.

Method

Participants

Participants in this study consisted of a sample of 30 male and 30 female undergraduate students from the University of Wisconsin-Stout (UW-Stout). There were 20 participants, 10 male and 10 female, in each condition. The participants were solicited from an online study recruitment program, as well as directly from two general psychology classes at UW-Stout.

Materials

The experiment was administered in several private rooms containing one participant each. Each room contained a computer on which the stimulus was presented on a time controlled Microsoft® PowerPoint® presentation. Each condition had its own PowerPoint presentation. The auditory stimulus was administered via headphones that were connected to the computers. Images used in the slide shows were attained through Google® image searches (Internet search engine). These images were manipulated to have white backgrounds with the use of Adobe® Photoshop®. The auditory stimuli were attained through free sound effect download websites. Each participant was given a sheet of paper that contained a numbered list for recall. The other side was blank and was used for the retention interval (that was presented through the slide show). The participants' gender and number were also recorded on this sheet.

Procedure

A pilot study was conducted that recruited 20 colleagues to ensure that all stimuli were easily identifiable and that the sounds, which accompanied images, were accurate representations of the image. This consisted of 20 slides with only auditory stimuli to validate recognition and clarity of the stimuli. Participants were asked to identify the object, as well as rate how confident they felt that they were correctly identifying the object. The rating for this was a scale from 1 to 5, 5 being the highest. Any auditory stimulus that was identified incorrectly by more than 3 colleagues, or received consistently low confidence ratings, was discarded from the experiment.

The experiment used a 3x2 factorial design. Groups were separated based on gender and the type of stimulus administered. Stimulus groups consist of visual only (V), audio only (A), and the simultaneous presentation of visual and audio (VA).

Upon arrival to the lab, each participant was assigned sequentially based on gender to one of the three conditions. The participants were then assigned to a room where they were presented with the visual stimuli from a comput-

The Effects of Simultaneous Paring of Auditory and Visual Stimuli And Visual Stimuli in Short-term Memory

er slide show and the auditory stimuli through headphones. Each participant was alone in the room during the test. The participants were given simple directions by the experimenter, which were also displayed at the beginning of the slide show. The experimenter then left the room and the participant could begin the slide show, by pushing the space bar, when ready. The stimuli consisted of 15 slides that were preset to intervals of four seconds between transitions. Participants saw only a white screen in the auditory condition and were issued auditory stimulus via time controlled PowerPoint slides.

Following the presentation of the stimuli, the participants were given instructions to complete two minutes of math problems, displayed on the screen, to reduce rehearsal methods. They were told to use the blank side of the paper provided at the beginning of the experiment.

Following the two minute retention interval, participants were then given two minutes for free recall of the presented stimuli on the front side of the paper provided. The amount of words recalled during the free recall period was the dependent variable of this experiment. Following the experiment, the participants were debriefed and informed that the study had nothing to do with their mental capacity or intelligence. Also, the type of results that were expected from each of the three conditions were discussed. They were also told that their recall scores would be kept anonymous.

Results

A one-way analysis of variance (ANOVA) was conducted to examine the differences in means between the three groups. The number of words recalled was the dependent variable and the three conditions were the independent variable. The results of the ANOVA were significant, $F(2, 19) = 11.921$, $p = .000$. As hypothesized, the group that received simultaneous audio and visual stimuli had the highest mean ($M = 9.4$, $SD = 1.903$), followed by the visual group ($M = 7.95$, $SD = 2.231$) and the audio group had the lowest mean ($M = 6.60$, $SD = 1.142$). No significant differences were found at any level between males and females.

A Scheffe Multiple Comparisons post-hoc analysis was conducted as well to understand the specific differences between the groups. The results showed that the simultaneous stimuli group had significant differences at the 1-tailed level with both the audio group ($p = .000$) and the visual group ($p = .033$). The audio group and the visual group, however, did not have significant differences ($p = .103$).

Discussion

This study has displayed the positive effects of linking visual and auditory stimuli in short-term memory recall. Therefore, it can be concluded that the combination of simultaneous and related stimuli can enhance memory recall.

The results of this study could have an impact on education in the classroom and work settings. It has been established that short-term memory recall is necessary for one to truly grasp the information presented in situations. It is effective in places such as classroom lectures and work training programs because information can often be fleeting. Educators often have to be brief with some of the more detailed information because time constraints require them to focus on main points. These details, which are often only highlighted in a lecture or training session, are usually ignored. In order to get the full impact of an educational program, the minute details must be retained. It is common for educators to use an only auditory lecture with few visual stimuli, which typically consists of written words on a projector. The results of this study indicate that this is not the most effective way to fully convey information.

Combining vivid visual stimuli with auditory stimuli is shown to significantly yield better short-term memory recall. It can be concluded that changes to enhance education must occur to implement more interactive styles of learning.

There are some changes that could be considered for next time. Future research should look at the effects of an auditory stimulus of the word being pronounced. Also, a larger sample size could make the research more conclusive. It may develop some significant differences between males and females, or between the two isolated stimuli.

*The Effects of Simultaneous Paring of Auditory and Visual Stimuli
And Visual Stimuli in Short-term Memory*

References

- Burrows, D. & Solomon, B. A. (1975). Parallel scanning of auditory and visual information. *Memory and Cognition*, 3(4), 416-420. Retrieved September 22, 2004, from EBSCOhost database.
- Haan, E.H.F., Appels, B., Aleman, A. & Postma, A. (2000). Inter-and intra-modal encoding of auditory and visual presentation of material: Effects on memory performance. *The Psychological Record*, 50(3), 577-86. Retrieved September 22, 2004, from Wilson Web database.
- Shallice, T. (1982). Specific impairments of planning. *Philosophical Transactions of the Royal Society London*, (B)298, 199-209.
- Sharps, M. J., & Price, J.L. (1991). Auditory imagery and free recall. *The Journal of General Psychology*, 119(1), 81-87. Retrieved September 12, 2004, from Wilson Web database.

Transition from Home to College

Jamie Lutz and Jennifer Johnson

Undergraduate Students, Human Development & Family Studies

Key Words: Family boundary style, freshman, transition, college

Abstract: *Family Systems theory encompasses the assumption that a change in one family member leads to a change in one or more other family members. This is often the phenomenon that occurs within the familial system when a child leaves home to attend college. Another assumption from this theory includes the concept that families can only be examined or analyzed within their entire context. The ways in which open, closed, and random family boundaries affect one family member's transition into college (this being an individual child attending college as a first year freshman) and the changes that affect the family system will be examined. Identifying the existing boundaries by which the family operates, in addition to investigating how this affects the family and the individual child, is crucial. It helps to understand how a freshman student readjusts during the first year of post-secondary education.*

Introduction

In a past study, Kenny and Donaldson (1991) looked at the relationship between family structure and how college freshmen were able to function on social and psychological levels. Methods utilized within this research included a 55-item Parental Attachment Questionnaire, Family Structure Survey, Texas Social Behavior Inventory, as well as Hopkins Symptom Checklist.

The sample size for this study involved 226 first-year college students with 173 female and 53 male students participating. Of this sample, 78% were eighteen years old, 15% were seventeen years of age, 6% were 19 years, and 1% was 20 years of age. Eight-one percent of the students studied were Caucasian, 5% were African American or Asian American, 6% were Hispanic American, and 3% of the sample consisted of other ethnic groups (Kenney & Donaldson, 1991).

Results from this study included findings that college women reported closer attachment toward their parents compared to college men, and college women were more positive in their parental attachment than college men.

Positive parental attachment in the absence of both parental/marital conflict and familial anxiety related to the separation were associated with high social competence and low levels of maladaptive psychological symptoms for female college students. It was also found that college females, who reported moderate levels of family stress associated with the separation, still maintained personal social competence and acquired parental support. These findings are similar to assumptions based on attachment and family-structure (family systems) theories (1991).

Therefore, the question the present study tried to answer relates to family boundaries and the impact the transition into college has on first-year freshman. We attempted to measure the correlation between family boundaries and adaptation to change for first-year college freshmen. Family Systems Theory encompasses the assumption that a change in one family member leads to a change in one or more other family members. When a child leaves home to attend college, this is a phenomenon that occurs within the familial system.

Another assumption from this theory that ties into the research includes the concept that families can only be examined or analyzed within their entire context. A family researcher/practitioner must look at the familial system as a whole in order to understand family content and relationships. Within the research, we examined how open, closed, and random family boundaries affected one family member's transition into college (this being an individual child attending college as a first-year freshman).

In addition, we analyzed how this change affected the family system. As potential family life professionals, one cannot generalize how young individuals adapt to the university system until these professionals examine the family context that the child experienced when he or she left home and transitioned into college life.

It is important to identify existing boundaries and how the family operates as well as identify how it affects the family and the individual child. This, in turn, allows one to understand how a freshman student can readjust to a new lifestyle during his or her first-year college experience.

The proposed hypothesis for the study is that the more open the family boundaries become, the easier is the transition into college. The variables for this study included family boundaries and transition into college.

Methods

The variables within the present study are operationally defined in the following manner. Family boundaries are categorized as open, closed, or random. When rules are flexible, developmentally appropriate to all family

members, and exhibit morphogenesis (family is open to change) over time, open family boundaries are utilized within a familial unit. In these families, feedback is especially crucial, and the opinion of each family member is equally valued. Also, communication of these views is expressed freely and openly. Family boundaries are permeable. Members can move from one environment to another (such as from home to college) and not suffer negative family-based ramifications. In addition, individuals whose families possess open familial boundaries see change as a positive and necessary event.

Those who are apart of a closed family system perceive change as problematic and seek a morphostatic (resistant to change) environment. Familial feedback and communication are severely limited and perceived as satisfying the status quo. Rules are strict and usually do not change from one family life cycle stage to the next. Consensus is greatly valued within this family boundary style and family members are restricted from moving comfortably from one living environment to another. Change is seen as inherently negative and subject to a family-perceived crisis.

Random family boundaries exist when a family ceases to create consistent and clearly defined rules. Structure and consistency lack within the temporal arena of this familial unit. The communication style is usually expressed as a neutral, accidental event where members lack negotiation and collaborative decision-making skills. Change is seen as being dealt with when time deems convenient. Family members are free to move from one system to another without feedback or communication from other family members.

College transition is defined as being a first-year freshman exhibiting an easy, moderate, or hard transitional experience from home to college life. In addition, freshman attitudes toward overall college environment, dorm life, roommates, money, academics, and social activity were included within the operational definition of the collegiate transition.

Sample and Procedure

The population consisted of first-year University of Wisconsin-Stout freshman, between the ages of 17 and 19 years. The study sample included a non-random, non-probability quota and accidental procedure in which 32 students were asked to participate in the research study. The sample consisted of 21 Caucasian females and 12 Caucasian males. Of this sample, 71.9% were eighteen years old and 28.1% were nineteen years of age. Of the college students surveyed at University of Wisconsin-Stout, 100.0% were first semester freshman. Also, 96.9% of the students surveyed lived on campus in residence halls and 30.1% of students resided off campus.

The instrument used to assess the first-year collegiate transition consisted of a survey. The survey was based on a five-point Likert scale that asked students the following: personal attitudes and beliefs regarding family rules, opinions on family rule formation, communication with immediate family members, familial adaptation to change, roommates, college social gatherings, access to monetary funds, college staff, and campus services, as well as overall perception of transition to college thus far. The Likert scale survey ratings ranged from 1 (strongly disagreeing) to 5 (strongly agreeing).

Another component included in the survey was a semantic differential scale; it measured student's feelings of involvement and independence since entering college. It also identified feelings of support, organization, loneliness, confidence, outgoingness, knowledgeability, isolation, and satisfaction while attending college.

The measures used within the survey appeared to express face validity. The responses to survey questions that addressed the type of familial boundaries appeared to be positively correlated with responses to questions regarding overall college transition. The instrument appeared to express consistency and was a useful tool to gather this type of data. Reliability was assessed using Chronbach's alpha reliability test. For this particular research study, .4202 reliability was expressed for family rules, .6199 for college related aspects, .6982 for family communication, and .7471 for individual college student characteristics listed within the semantic differential portion of our instrument. Considering the limited number of variables assessed together, reliability was deemed existent within this study.

Data was collected the week of November 8, 2004. The process for data collection included the selection of a primary source method in which a collective questionnaire was distributed to first-year college freshman ranging in age from 17 to 19 years. With instructor approval, the surveys were dispersed to two UW-Stout Freshman English Composition courses.

Results

Data analysis was completed using the Statistical Package for the Social Sciences (SPSS 11.5). Study results were compared and analyzed using means, grand means, modes, medians, reliability and frequency scales, as well as recoding and correlation statistical assessments. As shown in Table 1, the variables are discussed in relation to the survey items. All variables listed in the semantic differential portion of our survey are listed as personal characteristics for college students. Descriptive statistical data analyses for variables tested are read as the following: The more open the family boundaries are result in a higher mean; the more closed the family boundaries are result in a lower mean.

Table 1

Survey items and their association with the Likert scale.

Survey Items	Variable
4,5,6	grand mean for family rules
7,8,10	grand mean for the communication with immediate family members .
11,12,13,14,15	College (attitudes toward college environment overall, dorm life , roommates , money, academics, and social activity).
9	family adaptation to change

Family Systems Theory was used as a framework for our research; our original hypothesis included the assumption that the more open the family boundaries, the easier the transition can be for a first-year college freshmen. To evaluate the association between family boundaries and college transition, a bivariate analysis in accordance with Pearson's correlation analysis were used for this study.

Results indicated that two of the three concepts related to Family Systems Theory were significantly correlated with positive personal characteristics listed within the semantic differential portion of the survey. The variable of family communication exhibited a high positive correlation of .624 to personal characteristics of the college students assessed. The variable of family adaptation to change expressed a positive correlation of .421 to freshman personal characteristics. The third concept, family rules, did not seem to make a significant impact on a first-year freshman's transition into college (.188).

Discussion

Taking this into consideration, we conclude that our hypothesis is partially supported in that the more open the family boundaries, the easier the transition to college for first-year freshman students. The results found in our research study suggest that there is a correlation between the openness of family boundaries and ease of college transition. When reviewing the data, college transition seemed to be easier when family communication and family adaptation was positive. Therefore, when a student's family has open boundaries, the student often has an easier time transitioning from home to college life. On the other hand, students who have minimal communication within his or her family tend to have a more difficult time adjusting to new life situations (ie. College).

Family Systems Theory emphasizes the family system as a whole and the interrelations between individuals. Therefore, families that are open and have permeable boundaries tend to accept change and find creative ways to adjust. They use communication skills well and try to help each individual within the system move towards change. These families may encourage the idea of college as a great opportunity to better one's self and open new doors for the future. Therefore, college students that have adjusted well to the transition may have come to college with a more positive and optimistic attitude towards the change. It has made it easier for them to adjust, and may be possible that open families may produce more confident children.

Limitations

Although our data supported our hypothesis as well as some of the Family Systems Theory, we feel that the findings were insufficient due to the following limitations.

Our sample size was too small.

We did not take into consideration gender and its possible effects on the study.

We did not take into consideration the effects ethnicity may have had on our study, primarily because all of our subjects were Caucasian.

Our survey did not look at the possibility of living alone.

We were unable to analyze random families. We only analyzed open and closed families.

The possibility of self-reporting bias, or the self-fulfilling prophecy.

Throughout the research process, we have learned that one's family of origin may have a significant effect on the transition from one life experience to the next. Through this study, we are able to see the importance that good communication skills have on ways in which people adjust. Families with children leaving for college and families who are more open to change tend to have a better time moving and adjusting through various life stages.

Our findings partially supported the assumptions of Family Systems Theory, which included communication between each individual as well as adaptation to inherent change. Due to the limitations of our research, we were unable to determine if the theory's assumption on rules were supported by our research; whether or not rules were clearly stated, and if everyone had input in the process of the rule making within the family. Because the assumption of rules was unclear, we were unable to determine the kind of family boundaries.

Some of the practical implications of our research include taking the information that we have found and using it on other campuses throughout

the nation. It can be used to help individuals who are having a difficult time with school and help them find ways to adjust. Such surveys could be distributed by residence hall coordinators, the administration, and counseling centers on campus to help assess some of the problems students may be having in their academics; therefore, the problems may be due poor adjustment. Although maladjustment is not always the culprit behind poor academics, it may play a substantial role in how involved and focused one a student is in his or her work.

Steps could be taken to help those individuals adjust. This could include an attempt to get the family more involved in their child's life by offering family days. A family day is an event where the family is invited to spend the day with their child and be involved in the college experience. Also, surveys, such as the one we used in our study, could be given to students in high school for those students planning to go on to college. Assessment of these surveys could determine whether or not pre-college programs would be a beneficial start to further advancement of their education.

Implications for Future Research

Future research in this area may be very useful in determining the types of programs that would be helpful in the adjustment from home to college life for students struggling with the transition. It would be important to take into consideration the limitations of our study and apply new ideas for future studies. When evaluating the results, it may be helpful for new studies to look at ethnicity, gender, and the geographic location of the subjects as well as the size of the high school,

References

- Kenny, G.A., & Donaldson, M.E. (1991). Contributions of parental attachment and family structure to the social and psychological functioning of first-year college students. *Journal of Counseling Psychology*, 38(4). Retrieved October 3, 2004, from EBSCOhost Database.

Male Odalisque

Roland Krager

Undergraduate Student, Art and Design

Male Odalisque, the working theme for my series, is a term that is an oxymoron by definition by relates to shifts in our culture and contemporary views on masculinity and sexuality. The odalisque traditionally refers to the female slave or concubine in the harem of a Turkish sultan, and was adopted during the nineteenth century by elitist Europe as a form of artistic eroticism. The “male gaze” associated with classical work is also adopted by the series through referencing the term *odalisque*. These male subjects are therefore effeminized, dominated, and abused in ways similar to their female counterparts.

The palette for this series contains the tones of traditional and academic painters: reds, browns, and blacks, another reference to traditional ideologies. The paper surface and body piercing needles reference the ephemeral nature of the human body.

I receive most of my inspiration from Luis Caballero, Sherry Saville, Odd Nerdrum, and Caravaggio. Saville’s interest in gender roles, Caravaggio’s theatrical compositions, and Nerdrum and Caballero’s ominous treatment of the figure have all led me to the *male odalisque*.

These paintings are intended to raise questions about pleasure, pain, sex, abuse, gender roles, homophobia, etc. They are intended to inspire thought about something unfamiliar or taboo and lead to understanding or wonder. These works are based on oxymoron. They are meant to confound perception rather than validate it.



Roland Krager (2004)
Odalisque 2
Oil on paper w/piercing needles; 30"x 44"



Roland Krager (2004)
Odalisque 3
Oil on paper w/piercing needles; 30"x 44"



Roland Krager (2004)
Odalisque 8
Oil on paper w/piercing needles; 30"x 44"

Ominous, Atmosphere, and Wheaton, MN

Ben Bauer

Undergraduate Student, Art and Design

While planning to create a new piece of art, I find a place or a situation that evokes a response. Most of my research is done in the field looking for the landscape that grabs that response. When the particular place is located, I record information through observations, sketches, photographs, and notes.

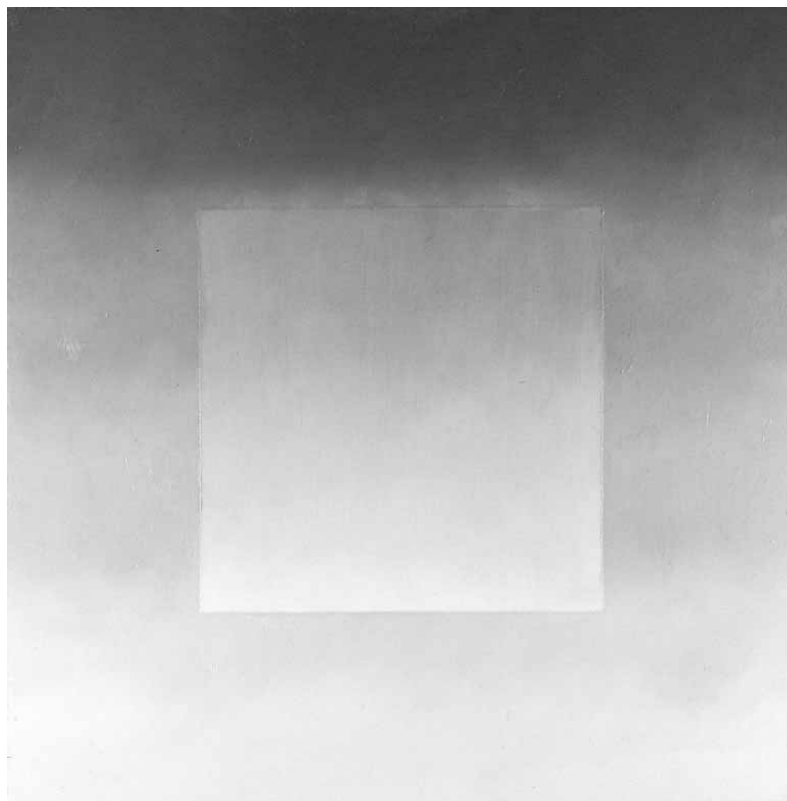
I then compile these reference materials into an idea and plan out the formal issues. I have found that small quick drawings and paintings help me find pleasing compositions, form, and color. Within these studies, I work quickly and in a painterly style. The main purpose is to give me a starting point and visual for the finished piece. The process for a finished painting begins with a panel or canvas that has been primed and sanded into a smooth surface. I sketch as much information as possible in pencil, and then I give the surface a layer of matte medium. The matte medium seals the gesso and pencil, and makes the oil paint flow like mayonnaise or butter.

In my latest body of work, I worked with the elements of sky and land and their relationship to each other. The slides illuminate the relationship between the sky and the land. I chose vertical formation order to discuss landscape painting in a less stereotypical fashion. Vertical format focuses mainly on things that are directly overhead and in front of the viewer, giving no peripheral vision. Placing a sliver of land along the bottom of the pieces allows me to demonstrate an anchoring device as well as where the colors originate in the sky. Along the series of five vertical paintings are two interconnected square paintings. The two smaller square paintings demonstrate a closer look at gradation in a cloud and how it happens. The paintings were painted by hand showing gradation effects and two others using a process done with a mechanical device. This is a process I had come across in print-making class that I wanted to interconnect with painting.

My ideas are composed through the love of the landscape that inhibits the upper Midwest. I am an avid outdoorsman and enjoy the seemingly untouched areas that still remain. I am attracted to the land because it offers a never-ending array of information that is valuable to an artist like me. What is valuable about my connection with the outdoors is the fact that it is greater than me; my ideas stem from lighting, weather, atmosphere, mood, seasonal interests, and studying other artists' work.

Several painters have had a major influence on me and my work as an artist. I am influenced by the following painters: Theresa Handy and Joseph Paquet (both from St. Paul, MN) and Jay Moore and Clyde Aspevig (both from the southwest). Theresa Handy's work is more minimal compared to Jay Moore, and Clyde Aspevig takes more of a plein air approach (paintings produced in the natural light outdoors). These four artists have created their own distinct styles; they have approached their work by painting landscapes using their own voice.

Learning from school, my own personal growth, and observing and studying other artists, I am growing in such a way that I am finding my own language and establishing my own parameter through the tradition of landscape painting.



Ben Bauer (2004)
2 Atmospheres: Warm & Cool
Oil On Canvas; 24"x 24"

Ominous, Atmosphere, and Wheaton, MN



Ben Bauer (2004)
Wheaton, MN
Oil On Canvas; 12"x 42"



Ben Bauer (2004)
Ominous
Oil On Panel; 13.75" x 13.75"

Aluminum Bottles are Successful

Nathan Goltz

Undergraduate Student, Packaging

Keywords: Aluminum, beverage industry, brand identity, environmentally safe, landfills, packaging, profits, recyclable, technology.

Abstract: *Aluminum bottles are the future for the United States beverage packaging industry. The use of these bottles has shown to increase profits for companies. Sales data has proven that customers are attracted to the new look of the aluminum bottle. Companies are continuing to test and produce the aluminum bottle worldwide while many more companies are considering the idea of using the bottle for some of their own brands. Most of the testing is being conducted overseas and showing excellent results, which could potentially interest the United States beverage packaging market. Not only is the look of the bottle important, but so is its environmental impact. Recyclability of the aluminum bottle is another key reason why companies are making the switch. With a growing environmental concern, many major beverage companies are increasing the number of products packaged in the aluminum bottle throughout the United States.*

Introduction

The aluminum bottle has many benefits, cost-wise and environmentally, and is considered the future of packaging for the United States beverage industry. There are four main points that demonstrate this claim. First, a new aluminum bottle design will most likely appeal to customers and increase sales. Second, the technology used to produce the aluminum bottle has proven strong. Third, aluminum is highly recyclable, which has enticed many companies to use this material. The fourth and final point discussed is the challenges companies could potentially face in the future. All of these claims will be discussed, but first, a brief description of aluminum's history will be viewed.

History

The material, aluminum, has been used in beverage packaging since its introduction to society in 1957. Throughout the aluminum can's 40+ year

existence, there have been a few modifications made. Only slight changes have been made to the features and overall shape. Aluminum was mainly used to produce cans in the beverage industry until 1998, when Sapporo Breweries®, located in Tokyo, utilized the first aluminum bottle to the beverage world created by Daiwa Can Company (Reynolds, 2000). Sapporo created an aluminum bottle that had the ability to use many different types of caps, such as crown or lug closure. The product was first introduced in Japan, where a popular demand for aluminum bottles occurred. Today, the aluminum bottle is slowly starting to appear on store shelves across the United States. Although the companies manufacturing the aluminum bottle are using the package for a variety of reasons, many are seeing extremely favorable sales results.

Aluminum Bottle Increases Profit

A common goal that all companies share is finding strategies of increasing profit. The new shape of the aluminum bottle is producing such results. Companies currently using this strategy are seeing increases in sales after introducing the aluminum bottle or changing their current package to aluminum. This helps to show that the consumer is willing to pay extra, which will help cover the cost associated with production. The new aluminum bottle will help increase brand identity with company product lines, which discusses the first claim.

Snapple's® Mystic RE energy drink was the first mainstream product sold in the aluminum bottle in the United States. The product is packaged in a 14-ounce bottle and sells at the retail price for \$1.99 per unit. The package was first introduced to grocery and convenient store shelves in May 2002. Snapple has seen a 30 percent sales increase as a result of introducing the aluminum bottle to the market shelf. Snapple is expanding the use of aluminum bottles to other beverages in their product lines (Todd, 2003).

Vincor International®, a United States winemaking company, introduced one of its products, Tabu, using an aluminum bottle beverage package. Tabu, a vodka-based beverage, was introduced to store shelves in May 2002 ("Beverages flow boldly," 2002). Vincor saw Tabu double in sales, which well exceeded the company's expectations, in only its first six months on the shelf. The initial estimations were to sell 35,000 cases of the Tabu product, however sales data showed the company sold 70,000 cases in the six-month timeframe ("Beverages flow boldly," 2002). The sales data is considerable, for Tabu sells at \$3.95 per bottle and is only sold individually or in packages of 24 (Dennis, 2002). Most of Tabu's competitors sell their products in quantities of four or six. Ed Martin, Vice President of Sales and Marketing

for CCL Container, stated, “Vincor wanted something cutting edge. What we came up with was a 59-mm diameter with a long-necked silhouette, unlike anything of its kind in Canada. It really grabbed the attention of the marketplace” (Kaplan, 2004, p. 59).

The aluminum bottle is slightly difficult to work with and is more expensive than the PET bottle to produce. However, as mentioned before, the customers are willing to pay for the added value (Barancik, 2003). According to Hoffman (2003), “the aluminum bottle they import from Spain costs four times as much to bring to market as glass currently, but this is due to the fact they import the bottle from Spain and are a small beverage company” (p. 22). They do not have the potential of larger companies to pursue in-house production of the aluminum bottle. Big Sky Brewing Company currently sells their aluminum bottles for \$1.79 each and they are available in 6, 12, and 24 packs.

Many innovative products emerge on the market at a higher retail prices. However, prices usually come down as manufacturing processes become well developed and companies learn how to mass-produce more efficiently. These bottles are selling faster than stores can keep the shelves stocked. Customers are willing to pay the \$1.79 for a bottle of beer, which is proof that they’re not questioning the expense (Hoffman, 2003). With the customer’s attraction to a new bottle design, the brand identity becomes greater. This creates an increase in sales because customers will buy what is familiar.

New Look Attracts Customers

All packaging has the potential to sell a product. When a customer goes into a store they will often check out the new package of the product they want to purchase. Not only does new packaging make customers curious about the package, the customers find out that the new package provides greater functionality than the previous package. One example is when the Coca-Cola ® Corporation developed and introduced the Fridge Pack (Roskelly, 2002). This modified package allows a case to easily fit inside of a refrigerator. It’s more functional than the traditional packaging because it saves space. This relates back to the aluminum bottle because companies, and customers, have seen how it is a unique package and made the switch.

Capri Sun®, a juice-making company, has produced a drink packaged in aluminum and is being sold in 16.5-ounce bottles (“Packaging strategies inside,” 2003). The company plans to stock convenience store shelves with this product to create a new market. By introducing the aluminum bottle into its juice line, they will increase brand identity by attracting new and loyal customers alike.

Customers seem to be very curious when it comes to new packaging (Hein, 2003). Many customers buy a product just because of the new look, whether it is a material, graphic, shape, or product design changes. In the perfume industry, manufacturers continuously look for unique and different bottles to catch the eye of customers, intriguing them to smell their product. This is similar with the beverage industry. One of the main reasons companies are switching to aluminum is to give the customer something new and unique to look at.

The aluminum bottle is a very versatile package, as mentioned before. The package has many benefits, as it is recyclable, lightweight, durable, and resealable. They are also easier to fill and pour ("FDL have got," 2003). There are various qualities to this bottle over other ones to go along with the list mentioned above. An advantage with the aluminum bottle is that it can be resealed, whereas a can cannot. It can be taken more places with more convenience. The aluminum bottle is better than glass because it is lighter and more impact-resistant. The product is comparable to plastic, but aluminum is better in the aspect aluminum has better barrier properties. Today, many people are on the go with work, children, and school (just to name a few). Companies realize this and have created a beverage bottle to better suit their needs. This helps to attract this type of customer, and there are quite a few.

A case study conducted by an independent research and development company compared the ability to chill and maintain the coldness of the liquid in the aluminum bottle. The company compared Danzka's® one liter aluminum bottle to a one liter glass bottle of vodka over the course of six hours. The results concluded that Danzka cooled 25°, 50 minutes faster than the glass bottle. It also took Danzka 50 minutes longer to raise it 25° ("The Absolut Spirits," 2004). Aluminum shows to have advantages over PET and glass, proving it would be a more convenient package for the on-the-go consumer.

Technology Here for Aluminum Bottle

Many major beverage companies are testing the aluminum bottle. The abundance of the companies investigating the bottle's potential should be enough to show those who have little interest to further pursue the development of the package. If major companies are testing the aluminum bottle as a potential package for some of their product lines, it could potentially start a major packaging revolution for all beverage lines. The companies could base their potential profitability after the success of other companies currently using the aluminum bottle for their product lines. Companies are testing the alu-

minum bottle worldwide, and the success companies are seeing currently in the United States and in other markets overseas in Japan and Europe, prove the innovation needed to succeed in the future. These innovative companies are leading the way for the rest of the beverage industry to the future of bottling.



Figure 1. A Japanese Coca-Cola bottle made from aluminum (Luk, 2002).

In addition to the companies that currently manufacture the aluminum bottle, there are many other companies looking to implement it into of their beverage lines. Heineken® beer has already introduced their product in aluminum bottles and indicated they have seen increased sales as a result. They also expect the idea to spread to other beverage companies. Heineken believes offering the new green and silver aluminum bottle will put them on the cutting edge of this technology (“Alu pack for,” 2002). Of course, they hope to gain a greater hold in the beer market by giving their brand a new and fresh look. Most of the companies discussed thus far have been trying to increase sales or create a new look. The beverage industry faces much competition with an assortment of options.

Coca-Cola is seeking to bottle some of their products in aluminum bottles, including their Powerade® brand and soft drinks. In the United States, they have already put Raize®, an energy drink, into an aluminum bottle (“Alu bottles for,” 2003). In Japan, Coca-Cola has already launched their soft drinks in aluminum bottles into the market. If they introduced the aluminum bottle to their product lines in the United States, their top competi-

tors will soon follow. The outlook for the aluminum bottle to penetrate further into United States markets is very promising.

Aluminum Bottle is 100 Percent Recyclable

The United States is a bit behind in designing and implementing environmentally safe product packaging. However, with increasing populations, the time has come to find alternative materials. Landfills are overfilled with garbage, which doesn't leave any space for new waste. Other countries the in world, such as Japan and European countries, are leading the way because there is much less room for waste in these countries. Companies have much to gain in changing their manufacturing lines to develop more earth-friendly packaging.

Hanson (2003) looks at this issue on a global level. Japan has enacted a new recycling law that could severely sway companies to implement the aluminum bottle. The law states that any manufacturing company exporting to Japan will have to pay recycling costs on any package made out of glass and plastic. This is most likely the reason why Coca-Cola sells their soft drink in aluminum bottle instead of PET.

Challenges for the Future

The aluminum bottle has two challenges for the future. First, in order for continual production, companies must see increasing sales over time to prove consumer demand. Second, they need to determine strategies in order to create a successful introduction on to store shelves. Companies have to implement the technology and put the aluminum bottle on the shelf in order to spur the success for the aluminum bottle trend.

Conclusion

The aluminum bottle is gaining popularity around the world. Using the bottle has many advantages in the United States beverage industry. It increases sales; appeals to the newer and loyal customers; and has a 100 percent recycling ability. This package will revolutionize beverage packaging. The aluminum bottle has already been implemented into many beverage lines around the world; for many companies have seen its success. Consumers are also willing to pay extra for a unique and functional package. This concept is relatively new to the beverage industry and the average total cost will go down as the consumer market expands. Even though questions linger about the long-term success of aluminum bottles, the successes of companies who are currently using the aluminum bottle prove that this is will be a popular trend in packaging.

References

- Alu bottles for premium Coke. (2003, July). *Packaging Magazine*, 3.
- Alu pack for Heineken. (2002, November). *Packaging Magazine*, 5.
- Barancik, M. (2003). Bottle cans have magnetic attraction. *Beverage Industry*, 94 (3), 56.
- Beverages flow boldly into aluminum bottles*. (2002, July 1). Retrieved February 2, 2004, from <http://www.packworld.com>
- Dennis, G. (2002). Bottling primal instinct. *Strategy*, 24.
- FDL have got the bottle. (2003, November). *What's New in Industry*, 47.
- Luk, C. (2002, July 1). *Cecilia Luk's Coca-Cola trade list*. Retrieved April 16, 2004, from <http://6x2.no-ip.com:8080/6x2/tradelist/jp>
- Hanson, S. (2002, July 1). *U.S. exports affected by Japan's new recycling law*. Retrieved April 4, 2004, from <http://www.fas.usda.gov>
- Hein, K. (2003). Strategy: Snapple seeking better chemistry behind inert elements sub-line. *Brandweek*.
- Hoffman, J. M. (2003). Extruded Aluminum Bottle: Next Big Packaging Trend. *Machine Design*, 75(22), 22.
- Kaplan, A. (2004, April 15). Can happen. *Beverage World*, 123(4), 59.
- Packaging strategies' inside track: a pioneer of juice pouches goes rigid with bottle can. (2003, January). *Packaging Strategies*, 21(1), 2.
- Roskelly, N. (2002). Delivering the drink: new packages for new (and old) beverage products. *Stagnito's New Products Magazine*, 2(6), 36.
- Reynolds, P. (2000, October 1). *Sapporo turns heads with shot bottle*. Retrieved April 13, 2004, from <http://www.packworld.com>
- The Absolut Spirits Company launches Danzka Vodka nationally. (2004, March 8). PR Newswire.
- Todd, H. (2003, December 15). A "can do" package. *Beverage World*, 122(12), 42.

Packaging Defines the OTC Market

Luke Greene

Undergraduate Student, Packaging

Keywords: OTC, over-the-counter, packaging, marketing, branding, drugs

Abstract: *Creating or enforcing a product's brand image with the proper use of unique packaging can positively affect sales and establish long-term customer loyalty. This paper discusses the idea of using packaging as a vital tool to create a memorable product brand. Topics discussed include the importance of package branding, "trade dress" patents, package redesign, cost considerations, and benchmarking.*

Introduction

Have you ever heard someone sneeze and say, "I need a Kleenex"? Then, the individual frantically searches for the nearest box of tissue, but does not realize that he or she has become a victim of product branding. The term "Kleenex" is a brand name of tissue manufactured by the Kimberly-Clark Corporation, yet most people associate "Kleenex" with any brand of tissue. In the following article, the idea that one product, such as Kleenex, can dominate the perception of so many consumers. This idea is referred to as branding; the idea that a product or manufacturer has a distinctive name. This article discusses the power of branding in the over-the-counter (OTC) drug market by introducing the concept of using packaging as a vital tool in creating a memorable product brand. Packaging can have a powerful impact on the purchase decisions of consumers. If designed or marketed improperly, sales and customer loyalty could be negatively impacted.

Package Branding Drives Sales

There is no question that marketing and branding are important parts of any business. The way products are marketed can and will vary between industries depending on the target market. Nonetheless, the goal of marketers remains the same for all businesses. That goal is to increase sales by creating a memorable advertising campaign, product/service, or creative package to gain market share in their respected industries.

Package Structure Dominates Competition

With over 100,000 products currently circulating in the OTC drug market, it is easy to see why branding is an important process when marketing an OTC drug (Choi, 2004). One way of accomplishing this is through creative structural packaging.

According to *Progressive Grocer* magazine, an example of this would be the upset stomach reliever manufactured by Proctor & Gamble, called Pepto-Bismol. We are all familiar with the brand name, “Pepto-Bismol,” but are not we also familiar with the products unique package, shape, and pink color? Private label companies that manufacture stomach relieving remedies similar to Pepto-Bismol typically use the same active ingredients, such as bismuth subsalicylate, which is naturally pink in color (Tarnowski, 2004). Attributable to the branding efforts of Proctor & Gamble’s marketing team, competitors are forced to identify their stomach relief medicine with the color pink. If they were to attempt to change the color to red, yellow, or blue the consumer may mistakenly believe the product is for treatment of another ailment and choose another brand (Tarnowski, 2004).

By communicating a product’s most believable and desirable attributes through packaging, customers are likely to purchase the product at least once. Then, if the product itself is worthy of repurchasing by the customer, brand loyalty will soon be established and sales will increase.

It is important to remember to keep the packaging features the same. For example, the primary packaging graphics should not differ from the secondary packaging graphics. This could cause confusion with your customers and ultimately defeat the purpose of attempting to brand a product/package. Instead, all packaging displays, components, colors, typography, and images should be consistent with the brand image (2004).

Package Designers Must Think “Brand”

Bill Schroeder, director of design services for Tipping Sprung states, “A quiet revolution has changed package design. Designers are now creating packages that are not merely memorable, but are also part of a brand” (Schroeder & Sprung, 2004, ¶ 1). Today’s packaging designers must design packages that exemplify the “brand’s promise and values” (Schroeder & Sprung, 2004, ¶ 4). This includes packaging graphics, structure, pictures, typography, and materials that help communicate the branding efforts (2004).

POP's Create a Center of Attention

Similar to creating an original or innovative package, Point of Purchase (POP) displays can also increase consumer awareness of a product brand. Often found on aisle end caps or side counters, POP displays are an eye-catching masterpiece for attracting and directing a consumer's attention to a product brand quickly.

Before designing a POP display, a company should decide what type of message is being conveyed to the customer. Patrick Sbarra, president of New Creature, designs, manufactures, and co-packs POP displays. Sbarra says there are a few questions that need to be answered before designing:

- 1) What does the real estate and buying environment look like?
 - 2) How many units are going to be on display?
 - 3) How many stores will it be in?
 - 4) Is the product being displayed new?
 - 5) Is the marketing and branding evident on the unit package itself?
- (Kania, 2004, 2).

Package Patents are a Must

Constructing a unique package is the first step in branding a product through packaging. The last, but certainly not least, is how we protect that unique package design from being infringed upon by our competition. As with all forms of intellectual properties, product packaging can also be patented for your protection from copiers.

“Trade Dressing” for Success

The term “trade dress” refers to the overall unique image of a product, package, and advertising. If a company's product/package is identifiable to a specific brand, a trade dress patent can be approved by a court to eliminate competing companies from mimicking their design. According to Rossette (2004), trade dresses that are “functional or utilitarian” (p. 24) cannot be protected. Only non-functional products/packages that are unlikely to cause confusion with previous products/packages from other companies, can be trade dressed. By working with a skilled intellectual property lawyer, you can determine your patent rights and protect your creative designs.

Package Redesign Catches Attention

Redesigning a package to increase sales can be a huge risk for most companies. In most circumstances a packaging engineer is hired to create, design and implement the most cost effective package for a product. This consistent

concern of package costs can hinder the marketability of a product and ultimately hold back potential sales. Although cost considerations are an important part of any business, there are other factors that need to be addressed before making a final decision on a package.

In today's markets, consumers enjoy having options and, with supermarkets carrying an abundance of products, options are what consumers will get (Kania, 2004). With all these options available, marketers must discover new ways to embed a memorable product brand into the minds of the consumer. At times, package redesign can provide a memorable brand.

According to Weisz (2003), there are three reasons companies should consider package redesign as an option: contemporary appeal, greater visual impact, and brand reinforcement or upgrade.

Contemporary appeal will be discussed first. As times change, so do consumer trends. To keep up with this constant change product brands and packaging must also change to continually meet the needs of the "next generation" consumer. Innovative packaging structures and graphics can play an enormous responsibility in keeping a product up-to-date. Even products with old-fashioned appeals must sustain a modern-day affiliation with consumers (Weisz, 2003).

The second reason is greater visual impact. When a customer enters a store, he or she is immediately exposed to a variety of products and package styles. Without realizing it, the consumer constantly judges the quality of the products based on the appearance of the package itself. "Packaging is the manufacture's primary line of defense against competitors" (2003). A smart package design can give a product a better visual shelf presence and separate itself from the competition.

Finally, the third reason for companies to consider packaging redesign is brand reinforcement or upgrade. With thousands of new products entering the market each year, it is important to remind consumers new is not always better. It is necessary to reinforce a product's brand principles by designing a package that reinsures consumers of values such as quality, reliability, and innovation (Weisz, 2003).

FDA Labeling Requirements Cause Concern

According to the Center for Drug Evaluation and Research (CDER), all OTC drug labels must include the Food and Drug Association's (FDA) standardized drug label by May 16, 2006. This will effect over 100,000 OTC drugs on the market and cost the OTC industry an estimated \$58 million. As a result, some manufacturers will have to redesign their packages to accommodate this new labeling information (ICMAD, 2004). Since redesign

is a must with this scenario, a company could use this opportunity to design a package that also helps reinforce the product's brand characteristics.

The new labeling format will have standardized headers and subheadings that allow the consumers to comprehend the information more quickly and accurately. This will affect the amount of space in which the package will have to convey branding information (ICMAD, 2004). Some of the required information required on the "Drug Facts Panel" (p. 13) are the following: lists of the active ingredients, product uses, warnings, and directions, warning statements, and the FDA has applied strict regulations on font sizes and styles that can be used to display information (2004).

Cost Considerations are Essential

When considering redesigning a package, many questions need to be addressed to increase sales. First, does the package need to be redesigned for any other reason besides appearance? For example, does the package protect the product throughout the duration of the product's shelf life? If not, then this would be the first concern in the redesigning process. Second, what type of equipment will be needed to compliment a new design? How much will it cost? Lastly, will the product sales benefit from a redesign? Since there isn't any way marketers can be 100% sure of how much a package redesign can increase sales, there will always be a risk in redesign.

In some instances a package redesign might not be as costly as one may think. Take for example, a package redesign project in which Mark Weisz Design limited the package redesign costs for a parboiled rice company.

The company came to Mark Weisz Design in an attempt to create a new look for their rice packaging. After researching information on the rice industry, they decided to enhance the appearance of the package and create a new brand image. The idea was to create a brand package that conveyed a "prize-ribbon" element using the colors blue and yellow-gold to emphasize the brand name, giving the package an increased visual shelf appeal (Weisz, 2003). In addition, they decided to enhance the quality even more by working with paperboard converters to implement in-line embossing techniques into the package. Weisz says, based on the company's production output, the cost of this additional improvement was less than a half a cent per carton (Weisz, 2003).

Benchmarking is Effective

Benchmarking ideas from competitive and non-competitive industries is not an uncommon strategy in today's aggressive markets. While marketing campaigns and branding initiatives remain unique to each product, similarities in

the structural packaging can be seen throughout every consumer industry. Provided these ideas are kept within the margins of package patents and trade dress laws, benchmarking an existing package design can pay dividends to a your company.

Listerine and Theraflu Innovate Oral Care

In 2001, Pfizer Consumer Healthcare introduced the innovative product and package of Listerine PocketPacks to the OTC oral care market (see Figure 1). The minty thin bacteria fighting strips revolutionized the oral hygiene industry, with sales over \$165 million in 2003 (Pressler, 2004). However the rest of the oral care market, including private labels, are now launching their own versions of the breath strips. This could result in lower sales for the Listerine Pocketpacks in the future. Although future sales may decrease slightly, Listerine PocketPacks have established itself as the “major” brand in breath strip industry, forcing the competition to play catch-up (Pressler, 2004).



Figure1. Introduced in the USA in 2001, Pfizer Consumer Healthcare



Figure2. Introduced in the USA in 2004, Novartis Consumer Health, Inc.

In 2004, the Novartis Consumer Health introduced their Theraflu Thin Strips to the antihistamine/cough suppressant market (see Figure 2). It was named the “Best Product of 2004” by Convenience Industry News (CIN) magazine, according to summary on the PR Newswire website (“Triaminic and Theraflu,” 2004). Among the many areas being judged for this award, such as the ability to provide accurate medicine dosages for each strip and package innovation, Novartis proved benchmarking beneficial. While the idea of the Theraflu Thin Strips was undoubtedly derived from breath strips, Novartis was able to further innovate an existing idea within the law and revolutionize the antihistamine/cough suppressant market.

Ethnography Generates Package Design Ideas

With today's market place becoming more and more competitive each day, companies are searching for innovative marketing methods and techniques to separate themselves from competition. One way of accomplishing this, is with the assistance of ethnography.

Ethnography is defined as the social science of observing and learning the behavior of people in their own environment ("Branding and Ethnography," n.d.). Instead of looking at the "overall picture," an ethnographer attempts to gain a detailed perception by examining only few subjects at a time (Lee, 2004).

Many giant consumer companies such as General Mills, Procter & Gamble Co., Kimberly-Clark Corp., and Unilever hire ethnographers to study consumers in their homes, work places, and preferred supermarkets (Lee, 2004).

For example, an ethnography study done for General Mills convinced marketers that children feel a sense of independence when they eat food "on the run." This research generated the idea for General Mills's new yogurt for kids, called Go-Gurt, a yogurt snack that can be sucked out of a flexible plastic tube (Lee, 2004). In another example with General Mills, researchers found that consumers stored their Bugle corn chips in the same cupboard as their cereals because the package was shaped like a cereal box. On the contrary, they placed bagged snacks on top the refrigerator for easier access. This alerted marketers to change the existing Bugle's chip package from a paperboard carton to a poly bag, ultimately increasing product sales (Lee, 2004).

Conclusion

Packaging can play an important role in creation of a memorable brand for drugs in the over-the-counter market. With over 100,000 OTC drugs currently circulating the market, products can easily get lost in the cluttered OTC isles of supermarkets. Through proper use of packaging materials, structures, graphics, typography, ethnography, and Point-of-Purchase displays, a memorable brand can be initiated to separate companies from competitors in attempt to gain market share in the OTC drug industry.

Benchmarking and redesigning existing packaging can assist in branding efforts, but only if the risk of extreme cost issues are kept to a minimal. FDA regulations will be fully enforced by May 16, 2006, requiring OTC drug companies to follow a strict standardized label format which allows consumers to easily interpret warnings, drug facts, active ingredients, directions for use, dosages, etc. Potential package branding

could coincide with the redesigning of packages to meet these new labeling requirements. All things considered, each company has to determine when or if creating a unique package structure is beneficial in regards to increasing sales. Using the expertise of brand managers, marketing, packaging graphics, and packaging engineering, a company can make a realistic forecast to determine if new packaging is the correct branding strategy.

References

- Branding and Ethnography*. (n.d.). Retrieved November 10, 2004, from www.dictionary.com
- Choi, P. (2004). The importance of packaging. *Dealerscope*, 46(4)
Retrieved Nov 1, 2004, from Wilson Web database.
- ICMAD and FDA give crash course in drug facts labeling. (2004, March).
Pharmaceutical & Medical Packaging News. Retrieved February 21, 2005, from <http://www.devicelink.com/pmpn/archive/04/03/013.html>
- Kania, K. (2004, February). OTC packaging: Point-of-purchase displays.
Pharmaceutical & Medical Packaging News. Retrieved February 21, 2005, from <http://www.devicelink.com/pmpn/archive/04/02/002.html>
- Lee, T. (2004). Science of shopping becomes big business. *Star Tribune: Newspaper of the Twin Cities*. Metro Edition, News Section, p. 1A.
Retrieved Sept 20, 2004, from NewsBank NewsFile Collection.
- Pressler, M. W. (2004). More for the mouth open wider, the oral-care. *Washington Post* (DC). F edition, Financial section, Pg F1.
Retrieved Nov 10, 2004, from NewsBank NewsFile Collection.
- Rosette, K. (2004). Dressing for trade. *Pharmaceutical & Medical Packaging News*, 12, 24.
- Schroeder, B., & Sprung, R. (2004). Memorable brand versus branded design. *Pharmaceutical & Medical Packaging News*, 12 (2), 24.

- Tarnowski, J. (2003). What's in a name? *Progressive Grocer*, 82(9), 93-4.
Retrieved Oct 11, 2004, from Wilson Web database.
- Triaminic and theraflu thin strips receive 'best product of 2004 award'*
(2003). Retrieved November 10, 2004, from
<http://sev.prnewswire.com/publishing-information-services/20041101/NYM22701112004-1.html>
- Weisz, M. (2003). Marketing misfires-10 tips for maximizing your package redesign dollars. Retrieved Nov 10, 2004, from Brand Packaging database.
- Young, S. (2004). Breaking down the barriers to packaging innovation.
Design Management Review, 15, 68-73. Retrieved Nov. 10, 2004,
from Wilson Web database.

Schools Linked to Obesity: Issues, Concerns and Reforms

Andrea Kolbeck

Undergraduate Student, Food and Technology

Key Word: obesity, schools, reforms

Abstract: *Obesity is a growing epidemic concerning children in the United States, which affects children's self esteem and school performance. Many concerns have been raised in relation to the federal government's school hot lunch programs and the steady increase in childhood obesity. Foods served in the school lunch programs are high in fat, sugar and calories. The goal is to offer foods that are high in nutritional value and also taste good. Schools are instrumental in shaping a child's diet and eating habits for the future. Using food contingencies also lead to negative and positive associations with vegetables and candy. The USDA is in the process of creating a small farmers initiative with schools to increase fresh fruit and vegetable consumption to help lower fats in the school lunch programs. School administrators also need to re-evaluate sugar consumption in correlation to vending machine sales in the schools. There is a significant need for change in the school lunch programs, administrative attitudes, and teacher responses.*

Childhood Obesity

Childhood obesity is a growing epidemic concerning the nation's children, and unfortunately, the public school system's hot lunch program is partly to blame. Obesity affects children's self-esteem and school performance. However, it can be combated through incorporating improved nutrition efforts into the schools.

After World War II, the National School Lunch Act (NSLA) was passed by Congress to ensure the health and well-being of the nation's poor and malnourished children. In 1946, Congress established the National School Lunch Program (NSLP) to "safeguard the health and well-being of our nation's children" (Gleason & Sutor, 2003, p. 1047). Today, approximately 99,000 schools and 27 million children participate in the federal hot lunch program, which includes lunches, breakfasts, and after-school snacks (Bush, G.W., 2003). Unfortunately, school lunches are high in fat and sugar content

and combined with decreases in physical education programs; juvenile diabetes and hypertension have increased. The percent of our nation’s 6 to 11 year-olds that are overweight has tripled in the last two decades. As shown in Table 1, the prevalence of overweight children and adolescents ages 6 to 19 has increased since 1963. Note the increase in overweight children from ages 6 to 11 is at 16% (Department of Health, 1999).

Table 1
Prevalence of overweight among children and adolescents ages 6 to 19 years, for selected years 1963-65 through 1999-2002 from the National Health and Nutrition Examination Survey (NHANES)

Age (years) ¹	NHANE S 1963 -65 1966 -70 ²	NHANE S 1971 -74	NHANE S 1976 -80	NHANE S 1988 -94	NHANE S 1999 -2002
6-11	4	4	7	11	16
12-19	5	6	5	11	16

Federal law requires that school lunches must provide one-third of the USDA’s daily requirements for protein, vitamin A, vitamin C, iron, calcium, and calories. It also requires that no more than 30% of calories can come from fat and less than 10% can be derived from saturated fat (Salisbury, 2004). The goal is to offer nutritious foods, but to also to offer items that children like to eat.

According to the USDA, an estimated 12% of food served to children in schools is wasted. Girls tend to waste more food than boys, and younger children waste more food than older children (Economic Research Service, 2003). Plate waste can be decreased by increased food choices with more options in variety and fresh produce. Seeking student opinions about food menus and allowing ample time to eat lunch, while implementing food preparation programs, will help reduce plate waste as well. However, it may increase operating and purchasing costs. Nine reasons for plate waste are discussed in Figure 1. Note the number one reason for plate waste is socializing and recess (Ralston, Buzby, & Guthrie, 2003).

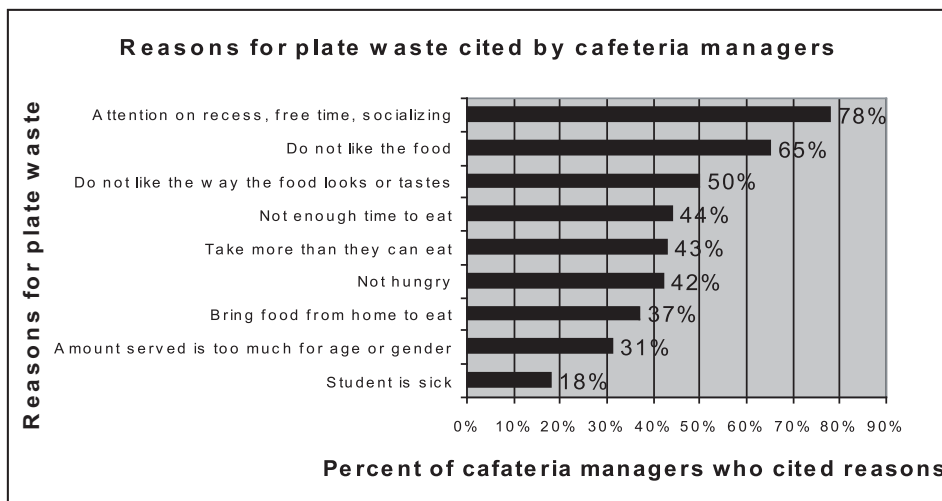


Figure 1. Graph depicting reasons for plate waste as cited by cafeteria managers (Ralston, Buzby, & Guthrie, 2003)

Scheduling recess after lunch creates a tendency for children to rush through the meal and hurry outside to play. This results in the children not taking enough time to finish eating their meals. Some schools allow only 20 minutes for lunch after seating. These are issues that need to be addressed. According to the American Academy of Pediatrics, “every school in every district shares a responsibility for the nutritional health of its students” (Health on the Net Foundation, 2004, p 11).

Schools exist in our society to educate children. Teachers do not realize they are influential factors regarding children’s preferences of vegetables and candy. When school children are asked to describe school lunch, usually ‘gross, nasty, and scary’ comes to mind and ‘if it’s good for you, it must taste bad’ mentality is present as well (Baxter, 1998). By the time children reach five years of age, they have already developed personal preferences as to what they like and what they do not care for. Schools are instrumental in shaping a child’s diet and eating behaviors. According to the Centers for Disease Control and Prevention Report, “Guidelines for School Health Programs to Promote Lifelong Healthy Eating,” teachers need to discourage the association between rewards and food. Schools need to create a healthful environment that encourages healthful food choices and carries out healthful food practices (Baxter, 1998). Children have a tendency to prefer sweet and non-sweet snack foods when given as rewards. Schools provide exposure to

both vegetables and candy, but vegetables are perceived negatively and candy is seen as a positive reward. For example, a child may be rewarded with treats if all of the vegetables are eaten. These food contingencies are teaching children to dislike vegetables and relish dessert (1998).

Parents want their children to eat healthy, but when they are in the lunch line, children make different choices. Children need extra guidance because they are neophobic. In other words, they are afraid of trying new things. According to the Pediatric Nursing, it takes 10 exposures before changes in dietary preferences can be seen (Cathey & Gaylord, 2004). David Levitsky, professor of Division of Nutritional Sciences at Cornell University, created a hands-on, in-class program with 600 students in 27 classes between the grades of kindergarten through sixth grade at Dundee Central School in New York. The two-part program was to decrease the amount of fat in the school lunch program while increasing vegetable and fruit consumption. First, the students studied eight different countries, including lessons in food and recipes native to each country. Next, students completed in-class cooking projects to make these recipes. After completion of the units, school cafeteria employees began making the recipes and incorporating them into the school lunch program. Burgers, fried chicken fingers, French fries were substituted with pasta, Chinese stir fry, primavera and African stews. Levitsky's survey data reported students were more willing to try new foods presented in this manner (Powers, 1996).

In 2002, the USDA spent approximately \$338 million on surplus beef and cheese for schools, and only \$159 million on fruits and vegetables (Hersey, 2004). School lunches do not serve more fresh fruits and vegetables because they are more expensive. The USDA is currently developing the "Small Farms/School Meals Initiative" in an effort to incorporate more fresh fruits and vegetables into the schools. Shirley Watkins, Under Secretary for Food, Nutrition and Consumer Services, U.S. Department of Agriculture states:

The Small Farms/School Meals Initiative is an important step toward improving both the economic stability of small farmers and the long-term health of our children in our school systems. The farmers sell fresh produce to local schools for use in their meal programs, and for children to get the benefit of adding fresh fruits and vegetables to their diets. It's a win-win situation for everyone involved. (United States Department of Agriculture, 2000, p. 2).

This program not only supports increased nutritional value from the fresh food, but it also creates a relationship with the farmers who grow the

food. The goal is to incorporate farmers into class-time during visits and explain how the produce is grown and how it incorporates into a healthy diet. This increases the students experience in the classroom, as well as the cafeteria, with first-hand knowledge of value and appeal of fresh fruits and vegetables needed in their diets. Problems associated with this initiative involve increased farmer's transportation costs, the inability to meet supply of volume, quality, selection, and variety of produce when the schools need it.

Children are a favorable choice for implementing social change. The United States Public School system must dedicate time and effort to increasing the nutritional values of the NSLP but it must begin with attitude improvement of public school officials. Profits prevail over nutrition. Schools and student organizations receive financial gain from the sale of candy, soda, vending machines, etc. Currently, no soda, gum, or candy can be sold on school premises until after the first lunch period (Salsibury, 2004).

These vending machine profits are usually spent on athletic programs and make up nearly 50% of the school's profit for the year. Contracts can range anywhere from \$20,000 to \$300,000. Blair High School in Montgomery County, Maryland, was paid \$100,000 up-front by Pepsi-Co[®] for exclusive advertising on the school's scoreboards. Plus, they were promised cuts of soda sales in the vending machines in Blair High School, which currently net more than \$100,000 a year from sales (Slobogin, 2001).

According to the California's Childhood Obesity Prevention Act, each additional daily serving of sugar-sweetened soda increases the risk of obesity by 60%. Over 20 years ago, boys consumed twice as much milk, and girls consumed 50% more milk than soft drinks. By 1996, boys and girls consume twice as many soft drinks as milk. It is the leading source of added sugar in a child's diet ("California's Childhood Prevention Act," n.d.). Over consumption of empty calories is a major reason of childhood obesity.

Coca-Cola[®] has begun scaling back marketing strategies in schools due to complaints of commercialism targeted towards children through the soft-drink deals. The company plans to replace advertising on its vending machines with non-commercial graphics of students engaging in physical activities and sports while stocking the vending machines with more nutritional vitamin-enhanced juice drinks, water, and sports drinks ("Coke Alters," 2001). This encourages more nutritional consumption for the students without undermining the revenue of the vending machine sales the school districts are strongly dependent upon.

According to survey by the Centers for Disease Control and Prevention, a fifth of all schools in the U.S. offer brand name fast-foods such as Pizza Hut[®], Taco Bell[®], and McDonald's[®] for hot lunch (Salisbury, 2004). Allowing these companies in schools supports industries linked to obesity and threatens the USDA's nutritional goals. Also, 92% of all schools allow a la carte options that lead to the unattractiveness of school lunch (Salisbury, 2004). Typically, these a la carte choices hope to establish brand loyalty, offering foods such as French fries, pizza, and hamburgers. These options do not adhere to federal standards due to the high concentrations in fat, sugars, and calories.

School learning environments are also affected by the nutritional deficiencies. Changes in reforming the school lunch menu have had a great influence on the Central Wisconsin Alternative High School in Appleton, Wisconsin. The cafeteria has replaced burgers, fries, and burritos with salads, degreased meats, whole grains, fresh fruits and vegetables ("A different kind," 2002). In 1997, Natural Ovens[®] of Manitowoc, Wisconsin, initiated a five year project to bring healthier meals to the school's cafeteria (2002). Major differences have been seen in student's behavior, health and learning. Students are no longer tardy and they are calmer. Daily discipline issues are no longer an issue at the school and drop-out rates are non-existent since the incorporation of healthier and more nutritious foods into the lunch menu (2002). One student commented,

Now that I [can] concentrate [because of the healthier food options] I think it is easier to get along with people because now I'm paying attention to what they say and not just worrying about what I have to say to them ("A different kind," 2002).

In contrast, according to the study of Physical Activity, Dietary Practices, and Other Health Behaviors of At-Risk Youth Attending Alternative High Schools, most alternative high schools do not support healthy eating choices as a normal behavior. The Central Wisconsin Alternative High School is an exception. Almost one-half of the students are eligible for the free/reduced-price lunch program. However, access is limited, participation is low, and less than optimal food choices are offered due to budget constraints, finite resources and additional challenges dealing with the educational needs of students with multiple problems (Kubik, Lytle, & Fulkerson, 2004).

Children and adolescents spend most of their time in school. Schools need to provide an environment that promotes physical activity and healthy

nutrition habits. Childhood obesity needs to be stopped. Reforming school lunches, eliminating food contingencies, increasing physical activity, offering a variety of nutritional options such as milk, fresh fruits and vegetables, versus soda, crackers and cookies, will begin to combat childhood obesity issues.

References

- A different kind of school lunch: Students in one Midwestern community are enjoying fresh, delicious food plus a big change in their learning environment. (2002, October). *Pure Facts*. Retrieved November 12, 2004, from <http://school-lunch.org/wisconsin1.htm>
- Baxter, S.D. (1998). Are elementary schools teaching children to prefer candy but not vegetables? *School Health*, 68 (3).
- Bush, G.W. (2003). *National School Lunch Week*. Retrieved November 14, 2004, from <http://www.whitehouse.gov/news/releases/2003/10/20031010-14.html>
- California's Childhood Prevention Act: California Senate Bill No. 677:Chapter 415*. (n.d.) Retrieved November 17, 2004, from http://info.sen.ca.gov/pub/bill/sen/sb_0651-0700/sb_677_bill_20030917_chaptered.pdf
- Cathey, M., & Gaylord, N. (2004). Picky eating: A toddler's approach to mealtime. *Pediatric Nursing*, 30(2), 101-106.
- Coke alters school plan (2001, March 14). *CNN Money*. Retrieved November 17, 2004, from <http://money.cnn.com/2001/03/14/companies/coke/>
- Department of Health and Human Services, National Center for Health Statistics. (1999). *Prevalence of overweight among children and adolescents: United States, 1999-2002*. [Data file]. Retrieved November 15, 2004, from <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/over-wght99.htm>
- Economic Research Service, United States Department of Agriculture. (2003). *Briefing Room: Child nutrition programs*. Retrieved November 12, 2004, from <http://ers.usda.gov/Briefing/ChildNutrition>

- Gleason, P.M. & Suitor, C.W. (2003, November). Eating at school: How the National School Lunch Program affects children's diets. *American Journal of Agricultural Economics*, 85 (4), p1047. Retrieved February 17, 2005, from EBSCOhost database.
- Health on the Net Foundation. (2004, January 5). *Health Highlights*. *American Academic of Pediatrics*. Retrieved February 21, 2005, from <http://www.hon.ch/News/HSN/516798.html>
- Hersey, J. (2004). *Hyperactivity, attention deficits, obesity and diabetes-on the menu in American schools*. Retrieved November 12, 2004, from <http://school-lunch.org/obesity.htm>
- Kubik, M., Lytle, L., & Fulkerson, J.A. (2004). Physical activity, dietary practices and other health behaviors of at-risk youth attending alternative high schools. *School Health*, 74, 119-124.
- Powers, M. (1996). Eat your vegetables. *Human Ecology*, 24(3). Retrieved November 16, 2004, from EBSCOhost database.
- Ralston, K., Buzby, J., & Guthrie, J. (2003, July). *A healthy school meal environment: Food assistance research brief*. Washington DC: United States Department of Agriculture.
- Salisbury, C.G. (2004). Make an investment in our school children: Increase the nutritional value of school lunch programs. *Brigham Young University Education & Law Journal*, 2, 331-352.
- Slobogin, K. (2001, April 1). Soft-drink issue bubbles in schools, Congress: Lawmakers mull capping campus soda sales. *CNN*. Retrieved November 15, 2004, from <http://cnnstudentnews.cnn.com/2001/fyi/news/04/30/school.junk.food/>
- United States Department of Agriculture Food and Nutrition Service. (2000). *Small Farm/Meals School Initiative town hall meetings: A step-by-step guide on how to bring small farms and local schools together*. Retrieved November 15, 2004, from <http://www.fns.usda.gov/cnd/Lunch/Downloadable/small.pdf>

Adapt to China's Shipping Environment

Justin Nunez

Undergraduate Student, Packaging

Key Words: China, packaging, distribution, shipping, logistics

Abstract: *Many United States companies have recently been moving their manufacturing over to China for reduced labor costs. However, many did not take into consideration the unique shipping and handling environment within China. These companies ended up experiencing high damage levels. This paper will discuss the differences in China when it comes to shipping and handling, and how to design and test packages to protect the products that will be shipped.*

Introduction

China is rapidly becoming a world leader in outsourcing of manufacturing jobs from developed countries. One of the major players in this outsourcing of jobs is major manufacturing companies based in the United States. Since the 1990s, companies have been moving these manufacturing jobs to China without a proper understanding of the shipping and handling environment. For some product lines, companies were reporting damage rates from fifteen to twenty percent (Baird & Young, 2004a). Since that time, there have been several studies done, and some still in progress. Many individual firms with the support of major manufacturing companies have conducted these studies in order to better define the shipping and distribution environment of China. Some of the companies cooperating with these studies include: Dell, Kodak, Hewlett-Packard, IBM, Intel, Johnson & Johnson and Lansmont (Baird & Young, 2004a; Joneson, 2004). With this information, a packaging professional can define package and test specifications for products manufactured and distributed in China. Packages must adapt to a completely different environment when shipping within mainland China.

Shipping Equipment Requires a Change in Package Design

One important point to understand before creating a package for products being shipped in China is the type of shipping equipment that is used. The modes of transportation and road conditions in China differ from those used

in the United States. Some of the tested methods and traditional package designs may not be applicable for the environment in China. One major study on China's shipping environment was conducted by Terry Baird and Dennis Young with many large corporate sponsors. The main types of trucks used in this study were eleven-foot straight open trucks, eighteen-foot straight open trucks, and fifteen-foot open trucks all of which had steel spring suspensions.

Also used were a thirty-five foot enclosed semi-trailer and a fourteen foot enclosed trailer (Baird & Young, 2004b). The United States uses more advanced suspension systems, including air bag suspension, which "provide a relatively low stiffness and therefore a low bounce frequency for a given axle load" (OECD, 1998). The type of shipping truck has a major impact on the type of packaging an engineer will use when creating packaging for specific products. These trucks have different resonating frequencies than trucks from the United States, causing a possible change in the test standard if shipped in China.

The road conditions in China are noticeably different from those in the United States, and must also be a major consideration for packaging engineers. The first key component that will be examined is the fact that eighty percent of China's roadways are unpaved as opposed to the United States' ten percent unpaved (Baird & Young, 2004a).

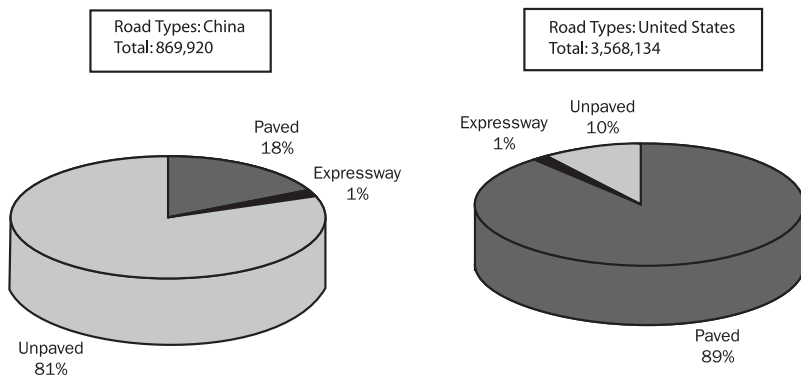


Figure 1. Road Types in the United States and China (Baird and Young, 2004b)

For example, Fortune Magazine describes the major metropolis of Chongqing as "a labyrinth of half-finished highways" (Thomlinson, 2004, ¶ 1). This city, once China's capital during World War II, has thirty-one million people (Thomlinson, 2004). Traveling on unpaved or unfinished roads

can result in accelerated vibration problems within a package. Another study is currently being conducted by Lansmont to determine vibration data on China's major distribution roads (Joneson, 2004). The study will involve performing over four hundred individual measurements within seventy variables in China in the course of one year (Huntley, 2004). Even after the research that has already been done on China's road conditions, there is still much to learn about the roads that connect its more than 3.4 million square miles. ("China,"2003).

China also has many unique types of transportation, which are greatly attributed to the mass of manual labor the country has. These types of transportation include carrying of small parcels by hand and delivery of packages by bike (Baird & Young, 2004a). The bikes are old and out of date and mostly carry more than one package at a time. This type of transportation can lead to more accidental drops than a more automated process (2004a).

Distribution Environment is Severe

The distribution and handling environment within China lacks proper handling equipment. This is a key area of the distribution cycle that the package goes through once at a distribution center or warehouse. In the United States automation is used for this process, which eliminates manual handling and greatly reduces accidental failures. In China there is a large surplus of manual labor, and it is widely used.

One time when a package is vulnerable to damage is when the truck or trailer is loaded or unloaded. One major set back for Chinese companies is the lack of shipping docks (Baird & Young, 2004a). To get around this disadvantage, trailers are loaded and unloaded manually by laborers and hand carried to and from the warehouse (Baird & Young, 2004a). This could result in dropping or tossing the package off the truck to other workers or into a stack before being moved inside the warehouse. Since no pallets are used inside of the trucks, there is little use for conventional fork trucks. However, fork trucks may still be seen during this process. They are used to hoist workers up to unload the top stack of packages on the truck (2004a). This increases the potential drop height of the package.

Once inside the warehouse, handling is very similar to the loading and unloading process. It is very labor intensive with multiple handlings of the package. The lack of fork trucks and pallets allow the unitized loads to become unstable by not having a solid base or a maximum height to stack the packages (2004a). For example, if a package became damaged during the unloading process it no longer has its structural integrity. If this package is placed towards the bottom of a unitized load, the whole stack will become

weak because of one package. Multiple handling of each individual package plays a large role in the large damage rates inside of the warehouse.

Shock and Vibration Data Show Unique Levels

The China Project was conducted by Terry Baird, who has twenty-five years experience in package testing and development, and Dennis Young, currently a senior consultant for packaging and packaging tests. During the project, several charts were created that documented the shock and vibration levels a typical package would see. This study was intended to define the shock and vibration environment in China. It was started in 1998 and took 4 years to complete (Baird & Young, 2004a).

To compare the results of The China Project to the levels that are tested to in the United States, Baird and Young compared their results to a common ISTA test spectrum and the UPS data. The X-axis shows the vibration frequencies that were measured by the recording instrument. The Y-axis shows the intensity levels that were recorded during each frequency (see Figure 2).

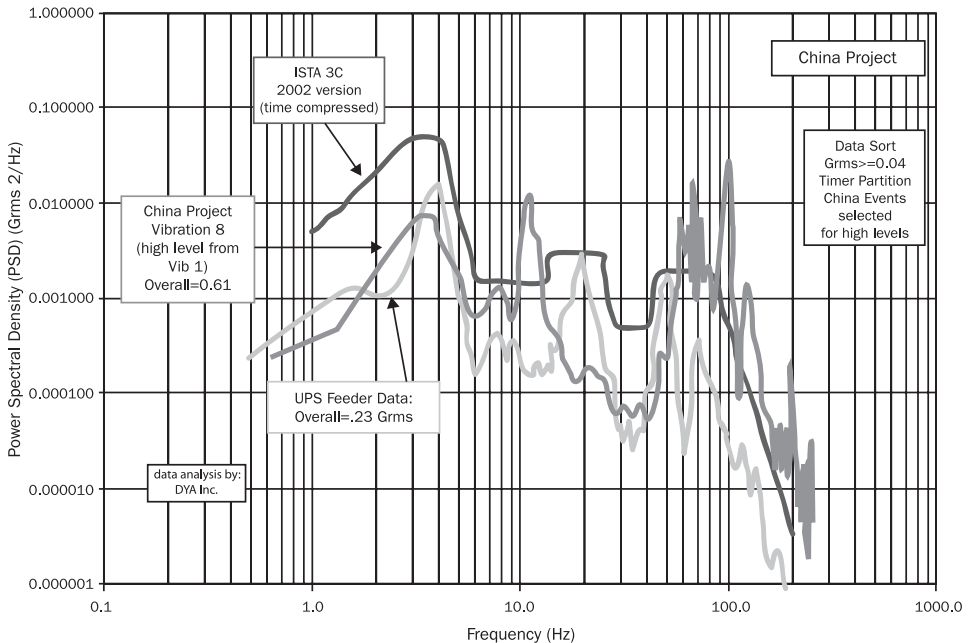


Figure 2. Vehicle Vibration Environment (Baird & Young, 2004b).

Figure 2 shows that the ISTA spectrum tests above what was seen during The China Project, except during a frequency between ten and eleven Hertz which could be considered a critical frequency. The sharp spike at ten Hertz is at a high enough level that it would need to be looked at carefully by a packaging professional with a product that has a critical resonance at that frequency. There is also a higher incidence over about 60 Hertz.

The data about dropped packages that was collected from The China Project also shows packaging professionals different variables to account for when shipping in China. The handling environment that the package must go through is one in which drops are almost the norm. Figure 3 displays the summary of the results from this project.

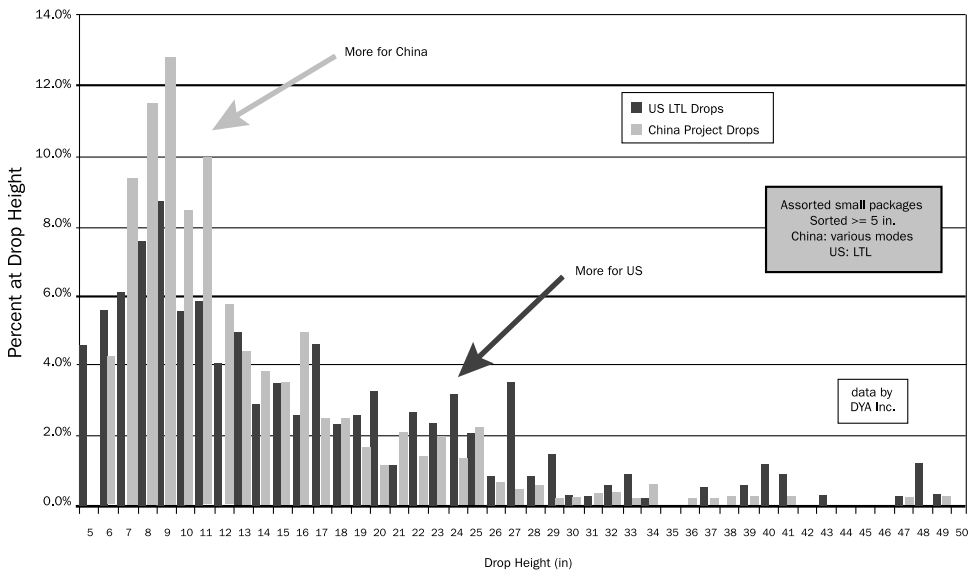


Figure 3. China / US Drop Comparison (Baird & Young, 2004b)

Figure 3 shows, on the X-axis, the specific drop height in inches compared to the percentage of the totals drops during a trip at that height. What one can see from this graph is that, at a lower drop height, China has a higher percentage of drops. This area ranges from 7 inches to seventeen inches. After that range, the United States has a higher percentage of drops around eighteen inches and above. Higher drops are a rare occurrence. The high percentage of the smaller drops from China should be a concern to a packaging professional due to repeated drops reducing the resiliency of the cushions inside of the package. Once some cushions are compressed they lose a portion of their cushioning characteristics.

Handling in a Climate Change Impacts Packages

As would be expected of any geographic area, there is a climate difference between the United States and China which could impact the packaging material used for different products. The climates in China are very diverse, ranging from tropical in the southern regions to sub-arctic in the northern regions ("China," 2003). For example, in Shanghai, a major manufacturing area in China, records an average high of eighty-eight degrees Fahrenheit in July and an average low of thirty-four degrees Fahrenheit in January. The average precipitation level can reach up to 6.8 inches in June with the dew point averaging seventy-six degrees Fahrenheit in July ("Climate," 2000).

For a comparison, Minneapolis has a high average dew point in July of sixty degrees Fahrenheit with the high average precipitation level being 4.1 inches during June ("Climate," 1999). This shows that the humidity is a little higher in China, with more average rain fall. This is a relevant concern when shipping in open container trucks, and unloading and loading trucks outside without loading docks. Without protected warehouses, the packages would further be susceptible to these external weather conditions. A packaging professional should explore the options of protecting their product with various types of barrier bags or additional protection. With a bag, the product would be physically protected from the environmental elements even if the outer carton may not protect it.

Import Regulations are an Implication to Packaging

If a package would ever need to be imported into mainland China from the United States, a series of import regulations would need to be complied with before the shipment would be accepted. To begin, if a company wants to import packages into China they must first become licensed through the Ministry of Commerce (MOFCOM) and meet a minimum capital requirement. For some products, for example plywood, a license will automatically be granted to the company, but this license is only used for tracking that specific commodity ("Import Regulations," 2004). One recent change to the regulations includes "all companies (Chinese and foreign) as of July 1, 2004 have the right to import all but a limited number of good [sic] reserved for importation through state trading enterprises" (2004, ¶ 3). This means that the government of China will allow unlicensed companies to import only a certain number of products. For products imported into China, a number of tariffs are applied based on the transaction value of the goods (2004). This would also cover packing charges, freight, insurance, and other charges that took place prior to the unloading of the goods at the place of destination (2004). With all these charges, the average tariff on an imported product in

2002 was 12.1%, with a commitment from the World Trade Organization to lower that to 9.8% by 2008 (2004). With these restrictions and tariffs on importing goods into China, it is very costly for companies to import on a regular basis. The packaging must be properly labeled for importing. For example, for importing a food product into China the product must have labels that show and explain its features and properties (Reynolds, 1999). These regulations need to be a concern to packaging professionals, since they may be held responsible for noncompliance.

Conclusion

To better understand how to package a specific product for shipping within mainland China, many variables must be considered. The shipping equipment used in China will induce damage to a product if not previously considered. The distribution and handling environment is very different from that normally seen in the United States. A product could be dropped more frequently during this process in China so dropping needs to be accounted for when designing a package. Once the package is outside of the warehouse it is susceptible to many environmental conditions that are different from those in the United States. There may be some additional packaging components that will need to be added to the complete package to protect against these conditions. A packaging professional must also have an understanding of the Import Regulations, since they may be held responsible for the regulations on importing their product into China. If all these variables are not accounted for, a packaging engineer will experience high damage rates in China. He/she could cost their company large amounts of money.

References

- Baird, T & Young, D. (2004a). The China Project: An assessment of the China shipping and handling environment. *Dimensions 04*. Retrieved October 4, 2004, from Baird-Young_paper_Dimensions04.pdf
- Baird, T. & Young, D. (2004b). *The China Project: A multi-search research project to measure the distribution environment within the People's Republic of China*. PowerPoint presented at Dimensions. 04: The International Forum on Transport Packaging. PowerPoint retrieved October 4, 2004, from Baird-Young_presentation_Dimensions04.pdf
- China. (2003). *The world factbook*. Retrieved November 20, 2004, from <http://www.bartleby.com/151/ch.html>
- Climate. (1999). *USA Today*. Retrieved November 20, 2004, from <http://www.usatoday.com/weather/>
- Climate. (2000). *USA Today*. Retrieved November 20, 2004, from <http://www.usatoday.com/weather/climate/asia/china/wshangha.htm>
- Huntley, D. (2004, September). *Lansmont field-to-lab: New instrument deployment*. *Lansmont Corporation*. Retrieved October 5, 2004, from <http://www.lansmont.com/Newsletters/Default.asp?YearID=12> p. 3
- Import regulations-China. (2004, August). Retrieved October 10, 2004, from <http://www.infoexport.gc.ca/ie-en/DisplayDocument.jsp?did=18005>
- Joneson, E. (2004, September). *Lansmont field-to-lab: PRC-PSD program*. *Lansmont Corporation*. Retrieved October 5, 2004, from <http://www.lansmont.com/Newsletters/Default.asp?YearID=12> p. 1
- OECD (1998, October 27). *Dynamic interaction between vehicles and infra-structure experiment. (DIVINE)*. Technical report. Retrieved October 4, 2004, from <http://www.oecd.org/dataoecd/8/57/2754406.pdf>
- Reynolds, S. (1999, July 27). *China, peoples republic of food and agricultural import regulations and standards*. GAIN Report, Foreign Agricultural Service.
- Thomlinson, R. (2004, September 20). *Inside the new China: The new wild west*. Retrieved October 4, 2004, from <http://www.fortune.com/fortune/articles/0,15114,698046,00.html>

A Research Review of “Taking the Load off a Learners Mind: Instructional Design for Complex Learning”

Timothy Barker

Graduate Student, Training and Development Program

Keywords: Cognitive overload, instructional design, manage overload, team learning, instruction, team based, cognitive, and development

Abstract

The design model, described by Merrienboer, Kirschner, and Kester (2003), relies upon four components: learning tasks, supportive information, procedural information, and part task practice. The complex, interdependent, and analytical nature of this model makes it very useful for designing instruction that can be configured into the steps they describe in the model. I believe this model has limited application to mechanistic processes that do not require even a moderate degree of abstract thinking. Because of the complex design of this model, designers and instructors are required to interpret the course information to a great degree so that it may fit within this interdependent design strategy. If trainees do not perceive the same connections between course components as the designers then cognitive overload may increase instead of decrease. The deficiencies of this model are caused by potential differences in individual perceptions. These differences may be reduced or eliminated through the addition of learning teams into this training design strategy.

Introduction

Complex Learning is the synthesis of knowledge, skills, and abilities including the transference of these skills from the learning environment to daily life. In today's high technology, on-demand business culture, the ability to comprehend multifaceted cognitive processes has become a requirement for successful business people. Learning of these skills can be impeded by the limited processing capacity of the human mind. Instruction often asks too much of learners without recognition of cognitive overload. Cognitive overload occurs when instruction requires learners to keep more processes in their working memory than they are able to effectively manage. The result of cognitive overload is learner frustration and unmet training goals due to

the learner's inability to retain and make use of the information presented in training. As the need for people who can cognitively manage multifaceted processes increases, the Training and Development industry is being challenged to create instructional designs that deliver this kind of learning strategy. Merrienboer, Kirschner, and Kester (2003), propose that complex learning be facilitated through an instructional design model that includes concepts of Cognitive Learning Theory and the Four Component Instructional Design Model (4C/ID). The purpose of this essay is to provide an explanation and critique of Cognitive Learning Theory and the Four Component Instructional Design Model as they are described in this article.

The 4C/ID Model

The 4C/ID model is based upon several design concepts and strategies that support student learning. As the focus of this model is to enhance learning while eliminating cognitive overload, the authors recognize that many supports for learning often contribute to cognitive overload. The learner is required to keep these supports in working memory while at the same time process the learning task at hand. Learning supports can include manuals, memorization of tables and formulas, and even verbal instruction. The success of this model rests primarily upon two concepts; support and fading. Supports are all processes and tools that are applied to training to enhance learning. Fading is the concept of sequentially reducing supports as the learner gains experience in order to facilitate naturalization of the learning tasks.

Whole and Part Task Organization

One of the supports in this model is sequencing, which entails introduction of simpler tasks before complex tasks. Organization of tasks can be from part-task to whole-task or whole-task to part-task. Sequencing learning based upon existing memory and experiences of either a part of the whole task, or a simplified version of the whole task, reduces cognitive overload before requiring working knowledge of the entire process. Part task organization focuses on understanding a part of the task in relation to the whole task and requires less cognitive load than understanding the entire process at one time. This approach fragments learning and does not facilitate synthesis of learning multiple concepts when used as the sole means of facilitating learning. Whole task organization introduces a simple view of the entire process and then, through training, expands the learners' awareness of more holistic and detailed versions of the concept by examining increasingly more complex levels of the entire concept. The whole task method of organization

requires that the entire concept or focus of training be divided into separate tasks to be accomplished. The related sequential tasks in the process that have similar complexity can be divided into task classes (groups of tasks).

Learning Supports

The authors propose three supports known as learning classes to reduce cognitive load within a single task class. The three supports are fading, worked out examples, and completion learning classes. The *fading principle* should be exercised throughout each task class in coordination with the learning class. “In a conventional learning class the learner is presented with a given state and a goal state and is encouraged to develop a problem solving process with which to transition from the given state to the goal state” (Merrienboer, et al., 2003, p.7). Due to this linear method of problem solving, this method requires a high cognitive load and tends not to allow learners to produce mental constructs that would indicate a level of mastery. It also weakens the development of problem solving methods because all constructs are generated from the learner’s experience base.

In the learning class of worked out examples, students are provided with a given state and a goal state as well as an example solution. This allows learners to create analogous examples that parallel the given solution. In turn, this facilitates superior problem solving processes at the beginning of learning, based on the supplied example solution provided by the instructor. “One drawback of this learning class is that it requires learners to process the example and the actual problem simultaneously, and may result in increased cognitive load” (Merrienboer, et.al, 2003, p.7).

“Completion learning classes provide a given and goal state but only a partial solution” (Merrienboer, et al., 2003, p.7). Because of the missing part of the solution this requires learners to be active as with conventional tasks. It also decreases cognitive load, as in worked out examples, by providing a strong problem solving example and not requiring complete memorization of the given solution. This set of supports explains how information should be presented within a training design. The next set of supports deals with the timeliness of when information should be presented within a task class, based upon the intended outcome.

Timing of Supports

When attempting a new task or task class, the necessary information must be in the working memory of the learner. There are two ways of ensuring that the learner has the information ready when completing the learning task. One way is to present information before application in the learning class.

The authors call this supportive information. It allows learners to study and practice so that the information is in long term memory and easily activated when needed to perform the task. This support works better for subjects of high complexity and that are variable, non-recurrent, task aspects dealing primarily with problem solving and reasoning, because it reserves mental capacity for performing the task. Providing necessary information prior to learning allows mental models to be formed before the cognitive load of problem solving occurs. The ability to perform non-recurrent tasks depends upon preexisting mental constructs that are relevant to the task. Multiple uses of the same construct prevents cognitive overload when the construct can be applied to various learning tasks. “Supportive information is kept available during learning tasks to serve as a reference to students when they are confronted with variable non-recurrent tasks” (Merrienboer, et al., 2003, p.9).

The second method for timing the introduction of supports is to do so precisely when it is needed. This is called procedural information. This type of presentation reduces the cognitive load by limiting the amount of knowledge required to be present in working memory during application of the learning task. It works well with low complexity information and dealing with highly consistent and recurrent task aspects. “Procedural information provides the how-to instruction and application of rules” (Merrienboer, et.al, 2003, p.9). Presenting information in this way, precisely when it is needed, prevents cognitive overload based on having to process a support while at the same time process the learning task. Information presentation must be fully integrated into the learning task. For example, using pop up menus in a computer program or having the instructor discuss the procedure while the learning task is being completed in order to avoid divided attention results in cognitive overload. “If full integration of supportive information into the learning task is not possible, presenting information before the learning task may be more effective” (Merrienboer, et al., 2003, p.10). Procedural information should be faded out of the learning experience as learners develop mastery within a task class to accelerate the naturalization of learning concepts.

Application of Supports for 4C/ID Model

Thus far, the supports upon which the 4C/ID model is based have been described. The following sections will give a summary of the model in application of these supports and follow with a critique of this model and supporting concepts. This model is based on four components; learning tasks, supportive information, procedural information, and part task practice

A Research Review of “Taking the Load off a Learners Mind: Instructional Design for Complex Learning”

(see model at the end of this review).

The authors propose three steps for designing instructions that makes use of these components. The steps are not sequential but instead cumulative, with the processes in each step building upon those of the previous step. In step one, learning tasks are identified and organized into a sequence of task classes. Each task class begins with a high level of embedded support. “A learning class would begin with worked out examples, then fade to less support using completion tasks, and end with conventional tasks which entail no support, before moving onto the next task class” (Merrienboer, et al., 2003, p.11). In step two, supportive information is presented at the beginning of training to prepare students to work on non-recurrent aspects of the learning task.

Learning tasks within the same class may be completed with the same general knowledge. In subsequent task classes, additional supportive information is presented to enable the learners to perform the more complex version of the whole task. Procedural information is presented just in time to perform recurrent and consistent aspects of the learning tasks. Procedural information is presented as direct how-to information and is quickly faded for subsequent learning tasks. In the final stage of design, step three, the whole task approach implies that recurrent aspects of performance are only trained in the context of the whole task.

If a high level of naturalization is desired for particular recurrent techniques, repeated whole task learning may not provide enough practice to allow for this level of development, without cognitive overload. For those specific aspects that are desired to be naturalized by learners, part task practice may be implemented into specific learning classes. Part task practice starts only after students have been introduced to the whole task subject of training. This allows learners to integrate and practice specific recurrent aspects into the concept of the whole task (Merrienboer, et al., 2003, p.11).

The end result of this design model is a training session in which students experience all three steps of design simultaneously, as appropriate within the sequence of the training program.

Critique of 4C/ID Model

My critique of this model will be based upon the following observations: the model demonstrates a high degree of concern for the learners cognitive process; this model requires extensive preparation and analysis on the part of designers which may produce flawed training based on the possible mis-

alignment in perceptions between the designers and learners as to the perceived complexity of skills being taught; and that the application of this model can be enhanced through the use of learning teams and related group development theories.

Overall, I consider this model to be very effective. It describes a detailed process for presenting learners with necessary information in a way that will allow them to process and retain that information. Before reading this article I was not aware of the concept of cognitive overload, though I had certainly experienced it. It seems to be a common flaw in the education paradigm of learning, to present as much information as possible and encourage the learners to retain it. The problem with this way of thinking, as the authors mentioned, is that it does not leave much working memory for the actual application of the learning. I remember a time in my undergraduate studies, having been tested on over one hundred pages of text. The professor would ask questions referring to specific terms and phrases as well as require us to synthesize concepts from the reading. There was simply too much information in my working memory from the text to handle complex processes like synthesis and specific recall and explanation. The result of this experience was not only poor performance on the test, but significant frustration, and very little retention of the subject content. Fading and sequencing are also familiar concepts in education; but combining these supports simultaneously with the process of analyzing the entire learning plan and dividing it into tasks and learning tasks that are enhanced with procedural and supportive information greatly increases the ability of a learning plan to accomplish the intended goal. The 4C/ID model requires significant interpretation of the data in the learning plan by the instructor in order to meet the requirements of each step in the design model. Because of the extensive planning required by this design it seems to place a greater emphasis on the needs of the student than any other design model that I am aware of. The combination of presenting procedural and supportive information in coordination with the learning classes based on division of learning into task classes demonstrates great emphasis on the needs and limitations of students and significantly enhances the likelihood that students will be able to retain and apply information presented in this manner to their daily lives.

Although this design model places great emphasis on the needs of the learner, it does so at the expense of great effort for the instructors and designers, and may allow for design flaws based on the incongruity between instructor and student perceptions. "Subject matter experts, who teach, typically deliver information too rapidly in chunks that are too large, resulting in learner overload" (Harrelson, Leaver-Dunn, and Martin, 2003, p.47). The

*A Research Review of “Taking the Load off a Learners Mind:
Instructional Design for Complex Learning”*

inability of the students to process the information at a rate considered to be appropriate by the instructor is likely to increase instructor frustration, and is likely to result in greater disparity between student and instructor perceptions. The 4C/ID design requires that every task in the learning plan be categorized into sets of learning classes, then those learning classes then must be categorized by complexity and their relationship to the whole task concept, and all information presentation be specifically timed within the training. While this model may contribute to a more synthesized understanding of the learning subject, it requires significantly more work on the part of designers than that required in a conventional design model. The necessary interdependence of concepts, and timing for presentation of information at each stage of delivery makes this an extremely complex and burdensome process for designers. If the desired learning plan can go without being changed or updated for long periods of time then this design method may be very useful. For training subjects that need regular adjustment, the complex nature of this model seems to make it unrealistic to designers that need short-term implementation that is easily changed to meet changing environmental conditions. The 4C/ID model is supposed to simplify learning for the students but relies upon the judgment of the instructors as to what information is more or less complex and which supports will help students at a specific point in training more than others. If students do not perceive the challenges and supports of the learning plan in the same way as the designers, then this highly coordinated and segmented design model may contribute to greater confusion and cognitive load as opposed to reducing overload. While a thorough needs assessment may allow designers to more closely match the perceptions of their intended learners, it is unlikely that any assessment tool would allow for a level of understanding that facilitates complete alignment of perceptions between learners and designers. The greater the degree of variance in perceptions between designers and learners, the less successful any lesson plan designed using this model will tend to be.

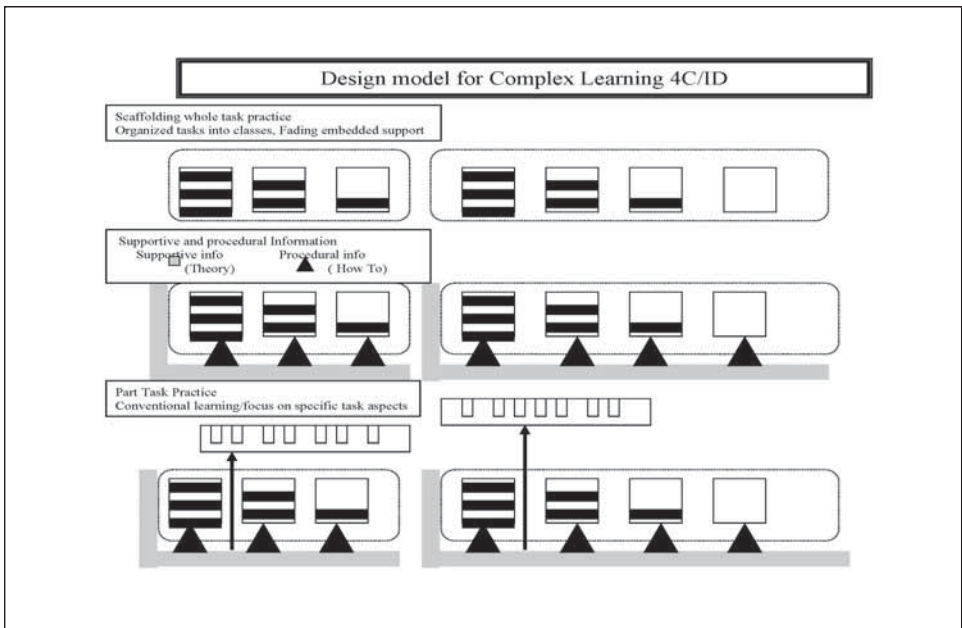
The flaws of this model tend to be exaggerated by the individual perceptions of students and designers. One way to reduce this flaw would be to incorporate group learning into this model. The inclusion of team based learning into this model has the potential to improve the application of this design model from the perspective of both designers and learners. If designers plan on creating skill groups or functional groups from the learners they can anticipate the needs of the learners with greater accuracy because the needs of a group tend to be more generalized than those of an individual. If more experienced group members were clustered with less experienced group members, designers could count on having a built in source of highly

integrated support within the learning team to further enhance individual learning. Because of the increased ability of groups to provide for the cognitive and affective needs of group members, individuals within learning teams would be more likely to succeed within the training program, than if they approach the learning objective as individuals. Rue and Byars (2000) claim that “when people are brought together in their formal job duties, friendships naturally emerge out of these continuous contacts...that can have significant impact on both individual and organizational performance” (p.288). The transference of learning from the training environment to the work environment would also be enhanced if training teams were composed of work teams as they exist in the world of work. Trainees would be more likely to transfer new skills if they attempted to apply these skills at work with the same people the skills were learned with in training. “The more immersed the individual is in the learning process the greater their ability to retain the skills and lessons learned” group learning activities “not only involve participants at the highest level of learning (teaching others) they also allow for different individuals to learn in different ways” (Cain & Joliff, 1998, p.2). Aspects of training that are forgotten may be corrected and supported by work peers without the need for costly retraining of specific employees.

The 4C/ID model relies upon four components: learning tasks, supportive information, procedural information, and part task practice. The complex, interdependent, and analytical nature of this model makes it very useful for designing instruction that can be divided into the steps for instructional design that are recommended by the authors. In theory, this model provides an easy to apply process for improving trainee performance based on synthesizing the various aspects of training that are presented through the course design. I believe that this model has limited application to mechanistic concepts and methods that do not require even a moderate degree of abstract thinking. Because of the complex design of this model, designers and instructors are required to interpret the course information to a great degree so that it may fit within the interdependent course design. If trainees do not perceive the same connections between course components as the designers, then cognitive overload may increase instead of decrease. The deficiencies of this model are caused by potential differences in individual perceptions. This variance may be reduced or eliminated through the addition of learning teams into training design strategies.

*A Research Review of “Taking the Load off a Learners Mind:
Instructional Design for Complex Learning”*

Merrienboer, et al. 4C/IDModel



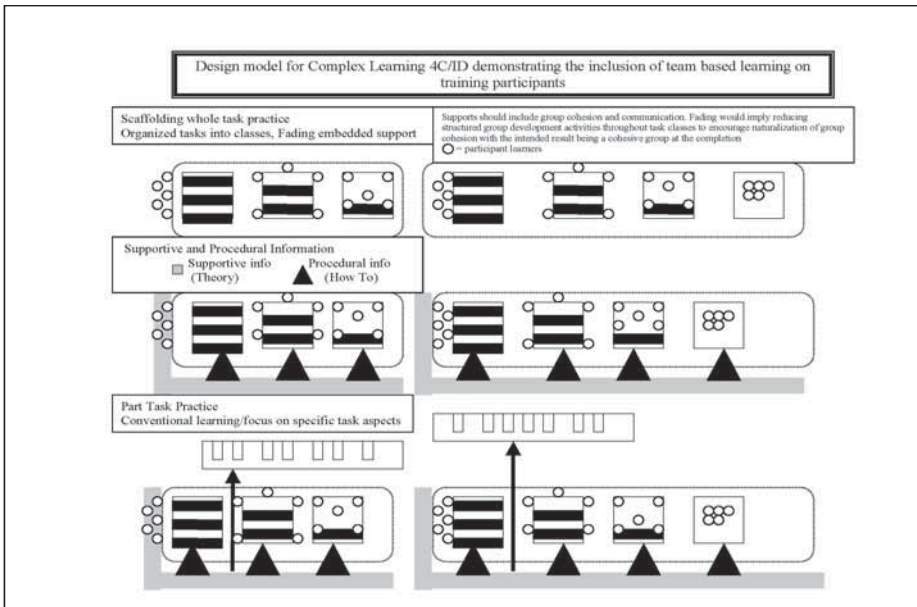
Model citation (Merrienboer, et al., 2003, p.11)

Description of Model

The three steps for design of the 4C/ID method are displayed in this model in descending sequential order from the top. The large rectangles represent task classes, and the smaller squares inside the rectangles represent specific learning tasks. Bars inside of the squares represent embedded learning supports. Supports are presented in great number at the beginning of the learning class and then faded throughout subsequent tasks to decrease learners' dependency on the supports. In step two the blue L-shaped line represents supportive information to be applied to non-recurrent task aspects and supplies general theory that is needed for that task class. Supportive information is introduced before the task class begins, with great emphasis, and is available throughout the task class. The black triangles represent procedural information. This specific how-to information is supplied exactly when the learner needs it for a specific task, and is removed when that task is completed. Step three represents the introduction of part task learning. Stand-alone lessons, for information about processes that require a high degree of

naturalization, can be introduced between learning tasks. Part task learning may involve multiple steps, but should only be introduced after the learner has gained an understanding of the whole task concept.

Adapted 4C/ID Model with Team Learning



Description of Adapted Model

The circles in this model represent the intended effects to the participants through the addition of team based learning to the 4C/ID model. Participants may be grouped at the beginning of a learning class but have no shared focus or perceived need of collaboration. Supports within learning tasks should address both the purpose of and the procedure for developing cohesion within the learning group throughout the learning classes. As supports fade, the participants should be experiencing a greater desire for and ability to be more cohesive. The end result of each learning class should be a group of learners that are capable of completing the learning tasks (closely grouped) without instructor-supplied support. Supportive and procedural information should address both task specific and interpersonal cohesion building theories and methods. One benefit of increasing cohesion within the participants, during the learning experience, is that they will be more fully immersed in the learning experience, as a result of personal interaction, and

A Research Review of "Taking the Load off a Learners Mind: Instructional Design for Complex Learning"

can be expected to have greater individual retention and learning rates. A second benefit is that if learning teams can be created from units that function together in the work place, the cohesion that is developed through this learning process can transfer back to the work place and deliver work teams that are more self supporting and less likely to experience performance detractors based on interpersonal conflict.

Conclusion

The student centered focus of the Four Component Instructional Design process sets an example that should be followed in other educational and training design programs. As the need for more effective training increases in contemporary and future business markets, instructional designers will do well if they make use of the learning supports described by Merrienboer, et al. To further increase the effectiveness of training, one may recommend that instructional designers implement team based learning into every aspect of training that permits this kind of interaction. Learning is a cognitive process, which may be accomplished without other people; however, the application of that learning almost always requires interaction between people. Integrating methods into instructional design to facilitate cooperative learning between people may be the only way to ensure successful implementation of the training as well as become the ultimate goal.

References

- Cain, J. & Joliff, B. (1998). *Teamwork and teamplay*. Dubuque Iowa: Kendall/Hunt Publishing Company.
- Harrelson, G. L., Leaver-Dunn, D., & Martin, M. (2003). Four tips to manage cognitive overload. *Athletic Therapy Today*, 8, 47-49. Retrieved October 25, 2004, from EBSCOhost database.
- Merrienboer, J., Kirschner, P., & Kester, L. (2003). Taking the load off a learners mind: Instructional design for complex learning. *Educational Psychologist*, 38 (1), 5. Retrieved October 20, 2004, from EBSCOhost database.
- Rue, L. W. & Byars, Lloyd L. (2000). *Management: Skills and Application* (9th ed.). United States America: McGraw-Hill.

Recycling Improves USA

Luke Monroe

Undergraduate Student, Packaging

Key Words: Recycling, landfill, greenhouse emissions

Abstract: *Changes are occurring in recycling that will improve the United States. There are significant improvements in the economy, environment and the health of Americans due to recycling efforts. Recycling will be shown as a superior option compared to landfill, incineration and virgin material processing. Many Case studies will be discussed that show how communities are making long-term decisions for recycling. The purpose of this study was to show the most important ways in which Americans currently benefit from recycling and how it will lead to further improvements in the future.*

Recycling Improves USA

Research was conducted to prove that recycling benefits Americans. The supporting data collected leads to many positive avenues relating to our economy, environment, and health. When these three factors are put together the results are overwhelmingly in favor of recycling.

In summarizing the past research and putting it in perspective with current events, it is obvious America's future will benefit from recycling. Many Case studies will be discussed that show how cities and communities are making long-term decisions for recycling plans. The main goals of the plans are to save residents money on recycling as well as provide environmental and health benefits. The purpose of this study was to show the most important ways in which Americans currently benefit from recycling and how it will lead to benefits in the future.

Recycling Improves the Economy

Recycling Creates Jobs

One benefit of recycling that is commonly overlooked is the jobs associated with it. In 2001 the National Recycling Coalition released a report that showed recycling does make economic sense. This report showed that jobs in recycling in America totaled over 1.1 million ("National Recycling Coalition," n.d.). This is comparable to the auto and truck manufacturing

industry. Wages in the recycling industry are higher than the national average wage for all industries. For the future, as the demand for recycling goes up, so will the demand for jobs in recycling. This is because the wages are competitive. This proves that recycling benefits America by not only creating jobs, but by creating well paying jobs.

Recycling Profits

Currently the most interesting benefit to recycling is the profits that have been generated in the last few years. While initial investment of new technology and implementation of new recycling systems may be high, profits for recycling can only increase in the long-term. The initial investments are only the short-term effects. For recycling the long-term effects should be considered since waste per person and recycled waste per person is on the rise ("U.S. Environmental," 2004). From the increase in both these areas it is clear that profits can easily increase.

In 2002 the city of Tucson, Arizona implemented a new residential recycling program. The new program was just under a year old when gross profits from the recycling program were estimated to be \$1.6 million for the 2003 fiscal year (Abeyta, 2004). Tucson area residents recycled newspapers the most, the recycled newspaper was turned into blank print and then sold back to Tucson Newspapers). The collected recycled glass was sold to Tucson Ready Mix INC (Abeyta, 2004). There it was ground and used to replace sand to make what the company called "glassphalt" and was used in making parking lots, sidewalks and biking trails. Other items like plastic, aluminum and steel were sold to local businesses or were often sold to China to meet their resource needs.

Savings from Reduced Landfill Use

It would make sense that fewer landfills would lead to savings. The city of New York has realized these savings. Mayor Michael R. Bloomberg has made plans to invest in a large long-term recycling program. The city made a contract in September with the Hugo Neu Corporation that will save the city money by paying less in fees for its recyclable trash (Urbina, 2004). The key to the plan will be finding markets for the recycled materials. Before the contract the city paid \$51 per ton, under the new contract the city will pay \$48 per ton for the first 5 years. The city is hoping that within 5 years, markets for the recyclables will be established and savings will increase. Currently, if the city didn't recycle it would cost them about \$70 per ton to have it sent to a landfill (Urbina, 2004).

The advantage that recycling has over using landfills, in an economic sense, is that money can be made from recyclables. Not only is there little possibility to make profit from landfills, landfills also have associated management costs. They need to be managed because it has been found that ground water must be checked for contamination and leachate must be treated properly. These are unexpected economical costs that could lead to unexpected negative environmental and health costs down the road.

One of the simplest ways to save money from reduced landfills is to recycle food scraps and yard trimming by using a compost pile. It is estimated by the EPA that 23.6 percent of our municipal solid wastes can be composted ("U.S. Environmental," 2004). This includes 12.2 percent from yard trimmings and 11.4 percent from food scraps. That is nearly a quarter of what might be in our landfills. This saves by extending the life of a landfill and reducing the landfill fees Americans pay. Recycling food scraps and yard trimmings would have no associated costs if the compost pile method is used.

Recycling Benefits the Environment

Cleaner Backyard for America

A benefit to recycling that maybe realized too late is the savings from having fewer landfills. The fact is that no one wants to live by a landfill. This is from fear of water contamination, air pollution and just the smell of a landfill.

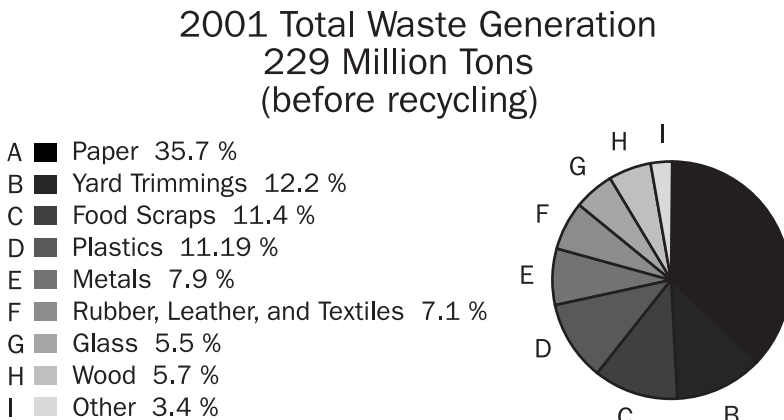


Figure 1. U.S. Environmental Protection Agency looks at the components of a landfill and the total waste generation ("U.S. Environmental," 2004).

As you can see most of our waste is easily recyclable. Adding up the paper, yard trimmings, food scraps, metals, glass, wood and some plastic show that over 80 percent of the United States’ waste is recyclable. This percentage would greatly reduce the number of landfills and benefit the environment.

Recycling Conserves Resources

Americans can benefit from recycling by preserving our resources. It is hard to determine when our resources will run out. By recycling, America can extend the life of our resources. Recycling does use energy as a resource from the transportation and reprocessing operations but it takes more energy to extract and process virgin materials. These environmental benefits also lead to economic and health benefits (see Figure 2).

Material	Environmental Impact with Recycled vs. Virgin	Natural Resource Savings with Recycled vs. Virgin
Aluminum	Reduces pollution by 95% (Reynolds Metal Co.)	4 lbs. of bauxite saved for every pound of aluminum recycled (Reynolds Metal Co.)
Glass	20% less air pollution; 50% less water pollution (NASA)	1 ton of glass made from 50% recycled materials saves 250 lbs. of mining waste (EPA)
Paper	95% less air pollution; Each ton saves 60 lbs. air pollution (Center of Ecological Technology)	Recycling of each ton of paper saves 17 trees and 7000 gallons of water (EPA)
Plastic		If we recycled every plastic bottle we used, we would keep 2 billion tons of plastic out of landfills (Penn State)
Steel	Every year we create 11.5 million tons of ferrous wastes (Steel Recycling Institute)	One ton of recycled steel saves 2,500 lbs ore, 1,000 lbs. coal, and 40 lbs. limestone (Center for Ecological Technology)

Figure 2. Examines natural resource and environmental savings when chosen over virgin material manufacturing (“Environmental benefits,” 1999).

Recycling Decreases Greenhouse Emissions

Scientists can prove that human activities have changed the composition of the earth atmosphere by releasing more than normal amounts of greenhouse gases ("U.S. Environmental," 2000). The effect that greenhouse gases have is they trap heat in the earth's atmosphere when increased levels of the gas are present. The two most prevalent greenhouse gases are carbon dioxide and methane. Recycling releases less of these two greenhouse gas compared to incineration, use of landfills and production of virgin materials.

Recycling produces less greenhouse gasses than the production of virgin materials because it takes a lot more energy to extract and process virgin materials than it takes to collect and reprocess recycled materials. The problem is the energy used has carbon dioxide as a by product.

Incineration also creates more greenhouse gases than recycling. The amount of carbon dioxide produced from incineration is substantially larger than that which is produced by recycling. The most widely recycled material is paper and if it is incinerated instead of recycled the negative effects are doubled. Trees will be cut down, so less carbon dioxide will be converted to oxygen, and the incineration of paper will create more carbon dioxide.

The second major cause of the greenhouse effect is methane emissions. Landfills are the largest source of methane gas (Energy Information, n.d.). Although this is changing because scientists have begun to harvest the methane gas from newer landfills and use it as a source of energy. Methane gas is not harvested at all landfills, especially old ones that are not set up for the operation. Landfills are still the single largest contribution to methane emissions. Methane gas is 20 times more effective at trapping heat in the earth's atmosphere than carbon dioxide (Energy Information, n.d.). This means that methane is an effective contributor to global warming, second to carbon dioxide.

Recycling Benefits Health

Recycling Decreases Water Contamination

The less Americans send to landfills would mean fewer landfills polluting our air and water. The main concern with water pollution from landfills is leachate. Leachate is the water that collects contaminants as it trickles through wastes. If leachate leaks from landfills it will cause toxic contamination of ground and surface water. If our drinking water is contaminated by leachate it can harm our health ("Hazardous Waste," 2004). To correct this, landfills must be designed with protective liners and collection systems. All of which are added economic expenses while our health is compromised. Both of these would be greatly decreased if we were to recycle more and dispose less.

Less Pollution from Virgin Material Manufacturing

In many cases, less pollution is generated when materials are made from recyclables as opposed to virgin materials. To get raw materials from virgin materials we must use extraction and processing techniques. These first two stages of material development pollute our air, land and water. They use a large amount of energy when compared with the amount of energy that is required to collect and reprocess recyclables ("U.S. Environmental," 1998). The creation of this energy creates more air pollution from the use of fossil fuels. The extraction stage can pollute our ground water when mine drainage occurs. Both stages put our health at risk from the lower quality of air and water.

An example of a material that is extremely economical to recycle is aluminum. Aluminum is actually the most recyclable material we use. Recycling of aluminum only takes 5 percent of the energy that is used to make aluminum from the virgin material bauxite (Hamilton, 2002). Once aluminum has been created it can be used over and over again without deteriorating (2002). With aluminum recycling using only one-twentieth the amount of energy of producing virgin aluminum, we can achieve a better quality of air and water for healthier living.

Negative Aspects of Recycling Analyzed

Economies of Scale

One problem with recycling is that there needs to be a sufficient volume of recyclable materials in an area to make it a profitable venture. Because of this, many low populated counties around America are prevented from recycling participation. One solution would be to reduce the costs associated with a small operation in many different areas and have one large-scale operation in a centralized location covering a few areas. One example of this method is a current situation going on in three Wisconsin counties. In 2002, Brown, Outagamie and Winnebago counties formed a tri-county cooperative agreement to reduce recycling and landfill costs and pass the savings on to the residents ("Brown, Outagamie," 2002). The counties plan to collaborate their assets and "increase economies of scale, maximize existing assets, and obtain operational savings" ("Brown, Outagamie," 2002, ¶ 4). To achieve this, each county played a role in selecting the locations for materials recovery facilities and landfills based on hauling costs for maximum efficiency. Once everything was in place the counties felt confident that the new system was cost-effective. The tri-county cooperative agreement recycling and solid waste plan is estimated to save the three counties \$35 million in disposal cost over a 25-year period and \$8 million in recycling costs over a 12 year period (2002).

Large Initial Investment Costs

The problem is that landfills are a better short-term solution and recycling is a better long-term solution, economically. Landfills are a reactive solution and recycling is a proactive solution. Figure 3 shows a rough estimate for which landfills are an easier short-term solution and reasons to support long-term recycling plans. The bottom line is that in the long run recycling has the potential of paying for itself whereas landfills do not.

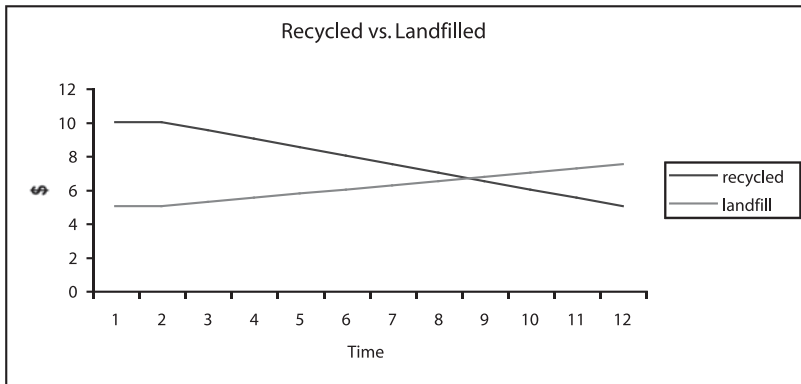


Figure 3. Recycling plans versus Landfills. ("U.S. Environmental," 1998)

Recycling Reduces Transportation Costs

A concern with the most popular recycling method, curbside recycling, is the associated transportation costs. Most people assume another recycling truck needs to be purchased and the pick up route will be covered twice. This, however, is not the case. Dual-collection and co-collection options are available (De Roze, 1996). With co-collection a trailer is attached to the traditional packer. With dual-collection a modified, or new, packer body is needed. In either case, an initial cost for truck improvement is necessary, but routes will not have to be run twice. The additional costs of the labor and transportation will be absorbed by the profit from the sold recyclables and the lower landfill fees. Now the possibility to break even or make a profit is possible.

Conclusion

Americans will benefit economically as well as environmentally and will be able to live healthier when recycling is chosen over other alternatives. The most important factor to most Americans is whether or not recycling is economically viable. The answer is yes, it is; in the long run. It is difficult to

put a monetary value on the environmental and health benefits because they are weighted differently by different people. However, if an individual cares even a little about the environment and their health, the total benefits still out weigh the alternatives.

Because landfill tipping fees are on the rise, recycling is getting even more economical. The main reason tipping fees are increasing is because it has been discovered that the air and water around landfills needs to be managed and this costs money. Setting aside monetary issues, Americans are starting to care more about the environment and their health. Right now the benefits of recycling are paying for themselves and them some. The outlook for the future of recycling is only getting better. The fact of the mater is that America is improving from recycling.

References

- Abeyta, O. (2004, January 19). Recycling: One year later. *Tucson Citizen*. (AZ), 1A. Retrieved October 21, 2004, from Newsbank database.
- Brown, Outagamie and Winnebago Counties, Wis. (2002, December). *American City & County*. Retrieved October 21, 2004, from http://americancityandcounty.com/mag/government_brown_outagamie_winnebago/index.html
- De Roze, D. (1996, December). Split streams create dual benefits. *World Waste*. 39 (12), 37.
- Energy Information Administration. (n.d.). *Emission of greenhouse gases in the United States 1999*. Retrieved November 1, 2004, from <http://www.eia.doe.gov/oiaf/1605/gg00rpt/methane.htm>
- Environmental benefits of recycling*. (1999). Retrieved November 20, 2004, from University of Massachusetts-Amherst, Office of Waste Management Moving Surplus Property Web site: http://www.umass.edu/recycle/environmental_benefits.html
- Hamilton, M. M. (2002, September 22). Is recycling being canned? *Washington Post*. Retrieved February 7, 2005, from <http://greenyes.grn.org/2002/09/msg00102.html>
- Hazardous Waste Resource Center. (n.d.). *Engineered landfills*. Retrieved November 1, 2004, from <http://www.etc.org/technologicalandenvironmentalissues/treatmenttechnologies/landfills/index.cfm>
- National Recycling Coalition. (n.d.). *Summary of highlights from the National Recycling Economic Information Project*. Retrieved October 26, 2004, from <http://www.nrc-recycle.org/resources/rei/summary.htm>
- U.S. Environmental Protection Agency. (1998). *Puzzled about recycling's value: Look beyond the bin*. Retrieved October 16, 2004, from <http://www.epa.gov/epaoswer/non-hw/recycle/benefits.pdf>
- U. S. Environmental Protection Agency. (2000). *Global warming – climate*. Retrieved November 1, 2004, from <http://yosemite.epa.gov/oar/globalwarming.nsf/content/climateuncertainties.html>
- U. S. Environmental Protection Agency. (2004). *Municipal solid wastes*. Retrieved November 27, 2004, from <http://www.epa.gov/epaoswer/non-hw/muncpl/facts.htm>
- Urbina, I. (2004, September 15). City sees savings in a partnership built of plastic and metal. *The New York Times*, B7.

Manuscript Preparation

Cover Sheet and Abstract

The cover sheet should include the following information:

Title of the article submission (not exceeding 60 characters)

Student Author's name

Research Faculty Advisor's name

The faculty research advisors name and signature should also be located on this sheet. Excluding the article title, none of the former information should be found anywhere else in the article submission to ensure anonymity during the blind review process. The cover page should contain the title, student author's name, and the faculty advisor's name.

The following page should include the article title at the top of the page followed by the abstract of the submission. This abstract should be used as an opportunity to give the reader a preview to the article and what conclusions were reached due in part to the contributions of the research. The abstract should be about 125 words but not exceeding 175 words.

Text and Style Layout

Submissions considered for publication must be double-spaced in 12-point Times or Times New Roman font, following the standard 8.5 x 11 page margins, and be completed using the Microsoft Word format. No specific length of manuscript is required but a 3,500 word (14-page) maximum should be recognized in this particular format. The body of the article should follow a clearly organized order of information presentation and can be written in either past or pre sent tense as long as the manuscript is consistent with American Psychological Association (APA) guidelines. Included in each submission should be a clearly defined introduction, main body, and closing remarks. The heading for each of these subsequent sections along with what information is presented within each section is dependant upon what is considered appropriate research for the author's corresponding field of study. It is at the discretion of the primary researcher and their selected faculty advisor to decide this information

Tables and pictures are encouraged and they should be prepared precisely for submission, as they are to appear in the Journal. Tables should be easy to read, clearly labeled with a brief, to-the-point title, and should be limited to not more than 5 tables or graphs in one submission. Pictures need to be

saved in .EPS or .TIFF format so that they have the best resolution possible and their effectiveness is not compromised during the production process. Graphs, charts, and photos should be constructed using, but not limited to, the Adobe Acrobat System, either Illustrator or Photoshop in any version, to preserve consistency throughout the Journal

Reference

A comprehensive citation of references needs to follow the conclusion of the article using the latest version of the American Psychological Association (APA) guidelines. The APA guidelines will also assist the researcher in properly locating graphs, charts, or photographs within the research article and then identifying them within the text. As the University of Wisconsin Stout is a diversified university with numerous disciplines of knowledge being practiced, alternative methods of reference formatting will be accepted if the researcher's particular academic major does not utilize APA as its primary method of educational reporting. For those submissions that are not following APA format, the format that is being used should be clearly annotated following the author's academic standing on the cover page of the manuscript

Procedures for Submission

The Journal of Student Research accepts submissions throughout the entire year, including Win-Term and Summer Session Periods. For an article to be included in the 4th edition of the Journal the deadline will be January 28, 2005 (Beginning of Spring Semester). There will also be a spring deadline of May 18, 2005 (End of Spring Semester) for those students who will be graduating and would like to submit their research for academic review during the 2005 summer/fall sessions. Article submissions should be in an electronic format with all subsequent information included. The electronic format should be submitted to the submission webpage for the Journal at <http://web3.uwstout.edu/jsr/>. The electronic version should be comprehensive in the fact that all tables and charts be included in the article body and not found in separate files or folders. The University of Wisconsin Stout requires that all students engaged in research involving human subjects or using data derived from human subjects to obtain the approval of the Institutional Review Board (IRB). Training and submissions material along with contact information can be found at the Research Services web page <http://www.uwstout.edu/rps/humnsbj.htm>. To keep with university policies concerning research it will be mandatory that proof of the training/IRB approval be included in the manuscript packet before acceptance of the article submission can take place. Authors will be notified of article acceptance in February and will have the opportunity to review/revise their submissions as suggested by faculty reviewers before the article goes into production. The editor reserves the right to alter submissions to fit the format that has been laid out for final production purposes

To submit your manuscript packet

Go to <http://web3.uwstout.edu/jsr/> and click [manuscript submission](#). Complete all specified fields.

If you have any questions concerning article submission guidelines or standards, Contact the Editor, Amy Barr, at barra@uwstout.edu or at Research Services (X1625).

**Journal of Student Research-University of Wisconsin-Stout
Reviewer Form**

Adapted from: UW-Madison Journal of Consumer Research Reviewer Report Form at <http://wiscinfo.doit.wisc.edu/jcr/RRF2.htm>. Last accessed on 3/7/2005.

A. Importance of topics/issues to the specific field of study Score: _____

Unimportant	Trivial	Modest	Important	Extremely Important
1	2	3	4	5

B. Quality of writing and other presentations (figures, tables, exhibits) Score: _____

Completely Inadequate	Major Problems	Minor Problems	Good	Superior
1	2	3	4	5

C. Conceptual rigor (clarity of objectives, treatment of relevant literature, logical reasoning) Score: _____

Completely Inadequate	Major Problems	Minor Problems	Good	Superior
1	2	3	4	5

D. Methodological rigor (research design, sampling, data collection/analyses as relevant to qualitative/quantitative data) skip if NA Score: _____

Completely Inadequate	Major Problems	Minor Problems	Good	Superior
1	2	3	4	5

E. General discussion and conclusions (implications, limitations, future research) Score: _____

Completely Inadequate	Major Problems	Minor Problems	Good	Superior
1	2	3	4	5

F. Paper's contribution to research in its current form Score: _____

None	Trivial	Modest	Important	Pathbreaking
1	2	3	4	5

G. Contribution if revised according to my accompanying comments Score: _____

None	Trivial	Modest	Important	Pathbreaking
1	2	3	4	5

H. Recommendation Score: _____

1. Reject unconditionally, because the likelihood of a successful revision is remote
2. Reject in current form, but allow resubmission of a substantially different version, according to my accompanying comments
3. Encourage revision, according to my accompanying comments
4. Accept conditionally, subject to minor revision, according to my accompanying comments
5. Accept unconditionally

I. Comments: Please provide clarification for scoring and any additional comments or suggestions in the space provided below.



STOUT
UNIVERSITY OF WISCONSIN